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7th Year of Publication

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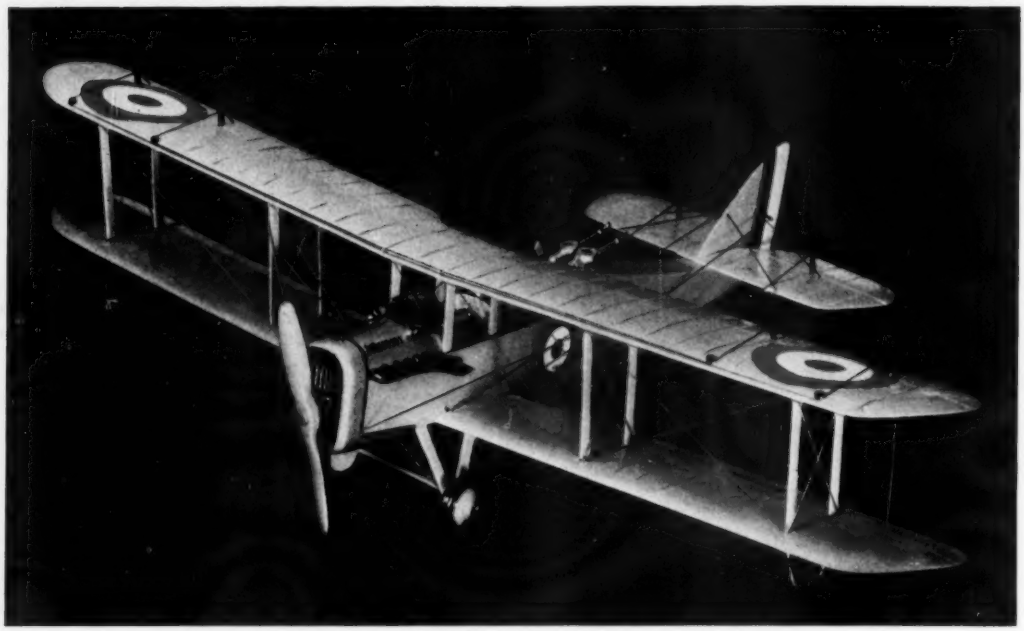

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Model AIRPLANE News

7th YEAR OF PUBLICATION

VOL. XIII *NO. 4*

Edited by Charles Hampson Grant

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NRA MEMBER U.S. WE DO OUR PART

In Our Next Issue

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High Lights of Indoor Plane Design, by Herbert Greenberg gives a resumé of the features of design that have enabled the indoor plane builder to develop this type of model to its present high state of efficiency.

Building a Simple Practice Plane, by Raleigh T. Daniel, provides the younger builder as well as the expert with a practical flying model that gives excellent performance under all conditions. It is very easy to build.

An interest-absorbing and instructive contest and series of articles will begin, entitled **Navigo'd,** by E. Semler, which will enable you to show your abilfty to navigate an airplane.

A new series of articles, **The German Airforce in the World War,** by Alfred Cellier, will tell you of remarkable and hitherto little known facts about German aviation during "the war."

Other interesting and instructive articles will also make the December issue of MODEL AIRPLANE News invaluable to you. They are, **On the Frontiers of Aviation, Detail Scale Drawing of the New Aeronca C-3, Air Ways, A Summary of Facts About Rubber Motors and Their Use for Power, a Plan of an all-balsa record-breaking glider, Aviation Advisory Board** and **N. A. A. Junior Membership News.**

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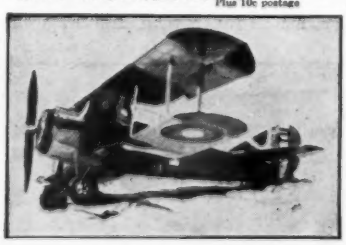

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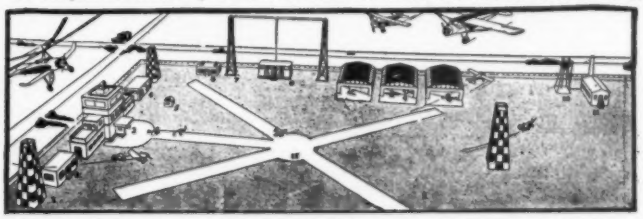

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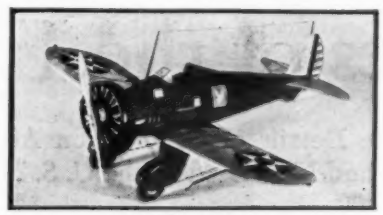

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One of the newer pursuit fighting planes now used by many U. S. Army squadrons. This faithfully detailed 1/4" scale model boasts every minute detail of the original ship: authentic louvres, exhaust pipes, navigation lights, built up detailed motor, etc. Colors are Army olive and yellow. The kit is complete with full insignia, detailed plans and instructions.

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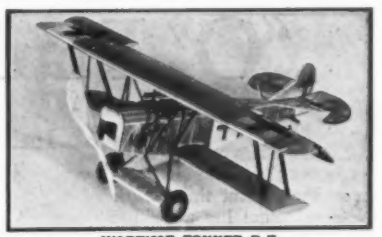

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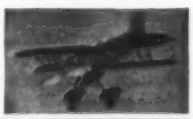

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1½"	per pr. .12
2"	per pr. .20
2½"	per pr. .20
3"	per pr. .25

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1"	per pr. .08
1¼"	per pr. .12
1½"	per pr. .15

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The new Curtiss OSC-1, a large number of which are now being built for the Navy

"O" Planes of the U. S. Navy

Intimate Details of Observation Airplanes Old and New Used by the U. S. Navy

By FRED BAMBERGER

THE U.S. Navy has a large number of airplanes in its service at the present time. Each of these planes has a definite type of work to perform. Some are used extensively for offensive work, and they are designated in this class. Others are used for defense. There are a number of other things that airplanes may be used for, such as, cargo and transport, training and miscellaneous uses, which we will discuss later on. Observation airplanes are very important in Naval work, as they are used "to see" just what is actually happening, which they report back to their respective commanding officers. It is very interesting to note the development of this type of airplane in the U.S. Naval Air Service. Let us look back and see just how far we have progressed in the development of this type, from some of the very early models to those of the latest date.

The original Curtiss observation airplane for the Navy looks to have been developed from the "Falcon" model of the Army. It was a two-seat biplane, with the upper wing swept back, which is so characteristic of the Army "Falcons." The Navy model was known as the Curtiss OC-1. It was different from the Falcon, however, in one respect. The Navy model had an air-cooled engine, while the Falcon had a water and later chemical-cooled in-line engine. The OC-1 had a Pratt & Whitney "Wasp" engine of 420 horsepower. The OC-1 was slightly modified and later became known as the Curtiss OC-2.

The personnel of the U.S. Marine Corps flew this type of airplane for quite a long period of time. In fact some of these OC-2 models are still being flown at the present date at the Naval Air Station in San Diego, Calif. One thing that may have helped in adding to the long life of these airplanes is the care which the Marines give to them. The writer has yet to see a Marine Corps airplane which was not always clean and ready for instant use, except under adverse weather conditions.

A new and sharply modified design was made of the OC-2 and a new model known as the XOC-3 was built. It was "cleaned up" more than the OC-2 and had a new type of air-cooled engine known as the Curtiss "Chieftain" which developed 600 horsepower. Very little information was made public on this plane, but the writer presumes that it was not accepted for service as only one was built.

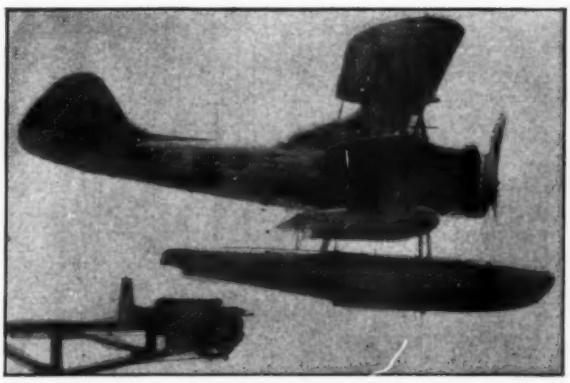
The next plane in this series was the Curtiss O2C-1 model, which many of us know as a "Helldiver." This was a two-place open cockpit land biplane. It was powered with a P & W "Wasp" engine of 450 hp. It was popular for its ability in "dive bombing." This is a very difficult maneuver and calls for great strength in the construction of the airplane. The Curtiss O2C-1 is not as fast as it should be, and is capable of only 120 miles an hour. "Helldivers" have, however, reached speeds in excess of 275 miles an hour, in vertical dives. Recently the Navy Department has issued an order stating that "No Helldiver shall be allowed to carry an observer while dive bombing." This would seem to indicate that the model has become obsolete.

In this series, Curtiss has built the O2C-2 model. This Helldiver has a Wright "Cyclone" of 575 horsepower and its cockpits are covered with sliding hatches. The landing gear has also been streamlined with the aid of "pants." It is considerably faster than the O2C-1 but few of this type have been built up to the present date.

Recently the Curtiss Company finished their latest model known as the Curtiss XO3C-1 also known as the OSC-1. It has

The new Douglas XO2D-1 with a 550 Wasp

The Sturdy Curtiss OC-2 Marine Corps Observation plane



Catapulting a Vought O3U-3. (550 hp. Wasp)

The B/J OJ-2 with 400 hp. Wasp

been sent to the Naval Air Station at Anacostia, D.C., for tests. This airplane was originally designed as a two-place biplane amphibian, with folding wings. It had a large single pontoon and landing gear similar to the Grumman type of landing gear which retracts into the pontoon itself. It also has its cockpits covered with sliding hatches and the tips of the lower wing are fitted with wingtip floats. A Pratt & Whitney "Wasp" engine of 550 horsepower is used. This ship is also equipped with slots and flaps in order to reduce landing speeds, and to prevent stalling when flying at a low speed. After being put through several types of tests by both the Navy and also the Curtiss Company, it has been changed so that it is no longer an amphibian, but will be either a land type or a sea type. According to latest figures a large number of this type plane have been ordered by the Navy, the plane to be equipped as a land model. Not much data is available at this time due to the fact that this airplane is still in experimental stages. Naval men say she is very fast for her type.

Douglas is a comparative newcomer in the field of observation airplanes for the Navy, although they have built quite a number of other types. Very little is known about Douglas' first effort, the Douglas XOD-1. The writer believes that this airplane crashed while being tested and the public never heard about it.

Their latest design is the Douglas XO2D-1, which is now being tested at the Naval Air Station at Anacostia, D.C. This ship is similar to the Curtiss XO3C-1, in its amphibian form, with which it was built to compete. It is similar in external appearance. It also has slots, flaps and folding wings like the Curtiss model. Another feature of the XO2D-1 is that it has hydraulic action in retracting and releasing its landing gear. This feature is blamed for the accident that this ship had while being tested. The pilot had been testing her awhile and came in for a landing. He released the landing gear, but only one wheel came out and it stuck, making it impossible to retract this wheel. He was now in quite a fix as one wheel was out and one was retracted. He finally decided to land the plane in the Anacostia River. He came in for a landinig and the airplane promptly went over on its back. The pilot was extremely lucky to get out unhurt. After being soaked all night, the airplane was hauled ashore and has since been rebuilt. According to the men, the Douglas is a shade faster than the Curtiss model, equipped as an amphibian. The Douglas XO2D-1 is now back at the Douglas plant for possible modifications which may be added to increase its performance.

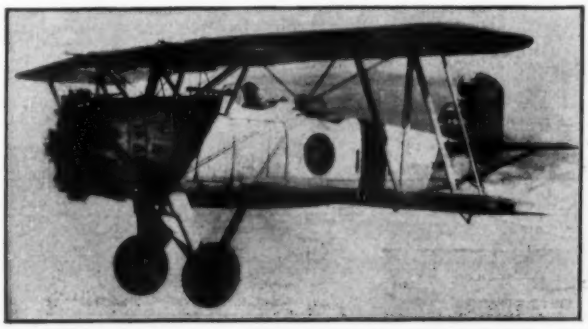
The B/J (Berliner Joyce) Corp., built a model known as the B/J OJ-1 powered with a Pratt & Whitney "Wasp" of 400 hp. Recently this OJ-1 model has been modified slightly and has become known as the B/J OJ-2. It is a two-seater biplane with straight wings of equal span. The observers pit is very "roomy." It has a square-type fuselage and is a rather sturdy-looking airplane. It makes about 155 m.p.h. top speed, and cruises at about 120. B/J has also built a later model similar to this one known as the XOJ-3. Not much is known of this type ship as it crashed while it was being tested. It was fitted as a seaplane when it crashed and it is probably being rebuilt at the present time.

Loening has long contributed observation airplanes to the Navy. Most of them all have been of the amphibian type. Most all of the Loening series of planes look alike. They have been commonly nicknamed "Ducks," characterized by a long pointed hull. All of them are biplanes and the only difference in them is the changing of engines and the changing of the interior structures.

The first Loening in the Navy was known as the OL-1. It was of the "Duck" type and was powered with an inverted Packard engine. The Loening OL-2 was almost an exact copy of the OL-1. The OL-3 was improved considerably over the first two. She had a splendid radio sending and receiving equipment and was very popular for a time. The OL-4 and the OL-5 were very similar to the OL-3. The only difference in them were a few minor modifications. The OL-6 was a test model. She swung a metal propeller and a number of other testing devices, including deck landing gear for carrier landings and take-offs. She also carried a Packard engine and had a very peculiarly shaped rudder, which looked like that of an Army Falcon. Exclusive of this rudder and the test devices, the OL-6 resembled the others in the "Duck" series. The OL-7 was used in further tests and was very similar to the OL-6, except for some structural changes. The OL-8 and the OL-8A are late models in this series, and are powered with a P & W "Wasp" 420 hp. The OL-9 is almost exactly similar to the OL-8 except for some internal modifications.

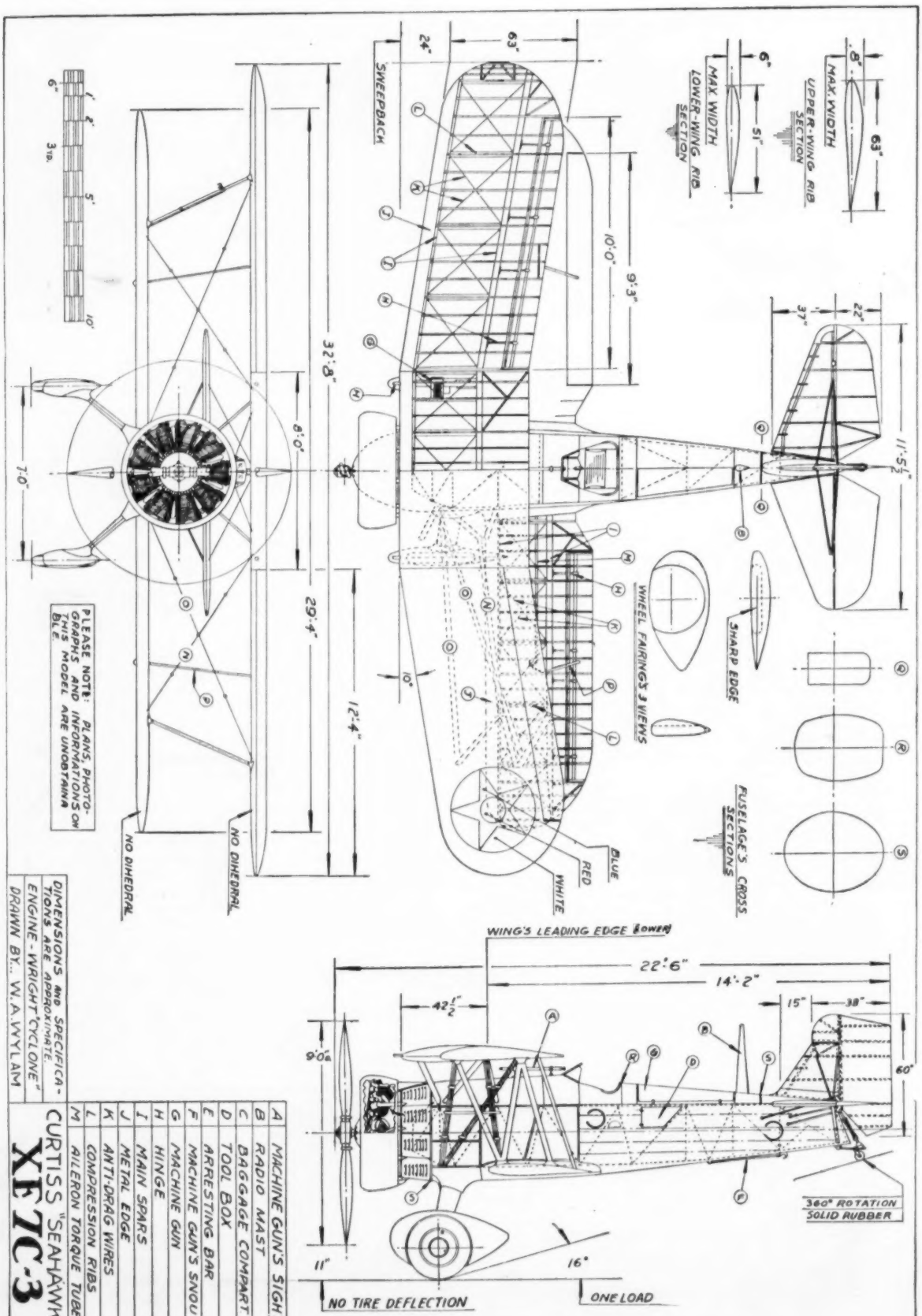
The airplanes in this whole series are similar to each other, and the first one made still sharply resembles those of the present day. Due to the peculiar shape of these airplanes they have often been called "The Flying Shoehorns." They are rather rugged, and have been used a number of times in catapult work. When an airplane can stand this strain of being shot off a catapult a

(Continued on page 38)



The famous Curtiss "Helldiver" O2C-1. (Wasp 450)

The Loening "Duck" OL-9 with a Wasp 450


CURTISS "SEAHAWK"
XFTC-3
DIMENSIONS AND SPECIFICATIONS ARE APPROXIMATE.
ENGINE - WRIGHT "CYCLONE"
DRAWN BY... W.A.WYLAM
PLEASE NOTE: PLANS, PHOTOGRAPHS AND INFORMATIONS ON THIS MODEL ARE UNOBTAINABLE.
A MACHINE GUN'S SIGHT
B RADIO MAST
C BAGGAGE COMPART'T.
D TOOL BOX
E ARRESTING BAR
F MACHINE GUN'S SNOUT
G MACHINE GUN
H HINGE
I MAIN SPARS
J METAL EDGE
K ANTI-DRAG WIRES
L COMPRESSION RIBS
M AILERON TORQUE TUBE
SWEEPBACK
MAX. WIDTH UPPER-WING RIB SECTION
MAX. WIDTH LOWER-WING RIB SECTION
WHEEL FAIRINGS 3 VIEWS
3 SHARP EDGE
FUSELAGE'S CROSS SECTIONS
BLUE
RED
WHITE
NO DIHEDRAL
NO DIHEDRAL
WING'S LEADING EDGE POWER
360° ROTATION SOLID RUBBER
NO TIRE DEFLECTION
ONE LOAD

A Silhouette Stearman Glider

A Miniature of a Well-known Plane That Gives Fine Performance, for Beginner or Expert

The completed silhouette glider ready to fly through its paces

By JESSE DAVIDSON

AND still they come. Clear your runway workshop table for the arrival of the Stearman Model 81, another silhouette-o-plane glider that will give you many pleasurable hours as you watch it spiral, bank, loop and glide gracefully earthward. Possessing beauty as well as distinctive performance, the ship is an eye-catcher of the first degree with its wings and tail painted aluminum and fuselage black and yellow with red trimmings.

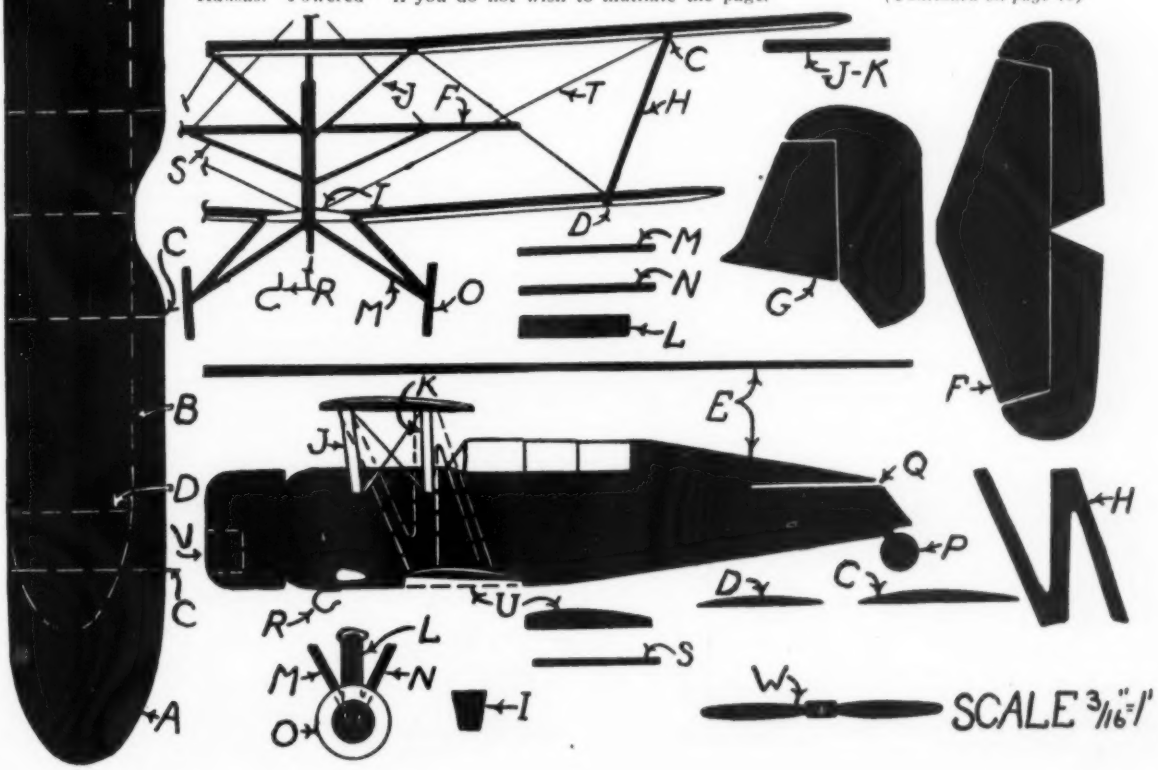
The real Stearman Model 81 is the latest commercial high-powered biplane manufactured in Wichita, Kansas. Powered with a Wasp Jr. 420 hp. motor, the ship cruises at 140 and tops at 170 m.p.h. It climbs 1100 feet per minute, flies at cruising speed 1033 miles non-stop and lands at 60 m.p.h. Its service ceiling is 17,000 feet. She is built for two, carries tandem controls, blind flying instruments and is propelled with a Hamilton Standard controllable pitch propeller.

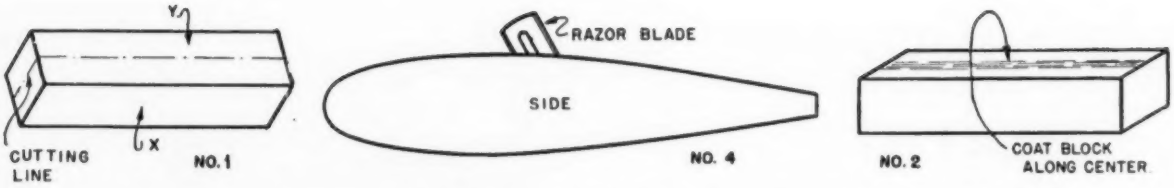
All materials are balsa except where otherwise specified. The patterns of the wing (lower wing outlined by dotted lines), side view of fuselage, rudder, elevator, all struts, wheel and prop, are the main parts of the model and are shown in black. The patterns may be cut out from this page to have their outlines traced onto the wood or you may use tracing paper to transfer the outlines of the larger surfaces. The latter method is urged if you do not wish to mutilate the page.

All the parts in the plan are indicated by letters and are listed below with their respective dimensions:

A. Top wing, 1/32" x 15/16" x 6-9/16"
B. Lower wing, (outlined in dotted lines) 1/32" x ¾" x 5"
C. Wing rib, upper, (make four) 1/32" x 1/16" x 15/16"
D. Wing rib, lower, (make two) 1/32" x 1/16" x ¾"
E. Fuselage, 1/16" x ⅞" x 4¼"
F. Elevator, 1/32" x 1" x 2½"
G. Rudder, 1/32" x 1-3/16" x 1¾"
H. N strut, (make two) 1/16" x ⅞" x 15/16"
I. Landing gear stub, (make two) 1/16" x 3/16" x ¼"
J. Center section strut, front, (make two) 1/32" x 1/16" x ¾", bamboo
K. Center section strut, rear, (make two) 1/32" x 1/16" x ¾", bamboo
L. Landing gear strut, (make two) 1/16" x ⅛" x 11/16"

(Continued on page 40)





Principles of Good Model Building

How to Build Efficient Balsa Wood Fuselages and Some Advantages They Offer

By HOWARD G. McENTEE

Part No. 3

THE hollowed-out type of fuselage which this writer has championed for some years now, is not by any means a recent development, models with this type of fuselage appearing on the market in 1919. Examples of this type of construction can be found in some of the older model-making books. It has never been very widely used, a fact to be wondered at, for the method has so many outstanding advantages. Foremost of these is the beauty and lifelike appearance of the finished model. Next comes the ease of construction and the ease with which the various essentials of a model such as wings and landing gear may be attached to the fuselage. It is only necessary to cut a hole in the shell, push the required part in and smear with glue. The usual necessary repair work is very simple, also, and a damaged section can be patched up so that it is absolutely not noticeable.

The weight of a finished fuselage of this type is little, if any, more than that of a built-up job with a reasonable number of stringers. One reason for this is that the motor stick is eliminated, since the shell itself is more than strong enough to stand all the rubber the model can use. The weight distribution is usually much better since the shell may be left very thick at the nose and the thickness tapered as the tail is approached. This puts the strength and weight in the nose where it should be, and permits a better balanced job.

As for difficulty of construction, it must be admitted that the hollowed-out type is more work to make than a simple square stick-type model, but when the latter is developed to a higher point with the many formers and stringers needed to give a near equivalent shape, then the hollowed fuselage comes out way on top. True, it takes some patience to carve out a good job, but what of that? It is certainly worth it in the end. And when it is considered that a finished fuselage can be carved out of a balsa wood block in one evening, the speed of this type of construction may be readily appreciated. And it is *not* so very difficult. The beginner should get this firmly in his mind before he lets himself be persuaded out of tackling the job.

It is admitted that the balsa block is considerably more expensive than the few sticks needed for a built-up job, but when the cost of the block is considered in relation to the value of a finished model, the extra expense becomes insignificant.

The actual tools needed are few, beyond those such as razor blades, knife, and so forth, that the model builder already uses. For small and medium sized models, the complete fuselage may be carved with a single gouge of about ¼" to ⅛" in width. For larger models, a gouge of about ½" wide or more will save considerable time. Small sets of several graduated wood-carving gouges are now widely sold in hardware stores, and these, due to the special curved blade, are excellent for our model work. A kit of four to six tools, running from ⅛" up to ⅛" or ½" would be just about perfect, and a fine investment.

While on the subject of tools, it may be well to mention another tool which is wonderfully handy for model work. It is the Handee Grinder, a tiny motor-driven tool which fits into the hand and runs from the light socket. It can be fitted with almost any imaginable tool, since it has a tiny chuck similar to that on an electric drill, but the wood cutters and sandpaper drum, the latter only 1" in diameter, are probably the most handy for the model maker. This tool, of course, runs into somewhat more money than the gouges mentioned above, but it is worth it in time saved to those who can afford it.

The wood for this particular type of model construction must be picked with care if the greatest ease of construction is to be realized. Of course, any wood may be used in a pinch, but that which is white, medium weight, and without imperfections, such as knots, splits and the like, is greatly to be preferred. Above all, do not try to use the "stringy" grade of balsa, as it is much harder to work with.

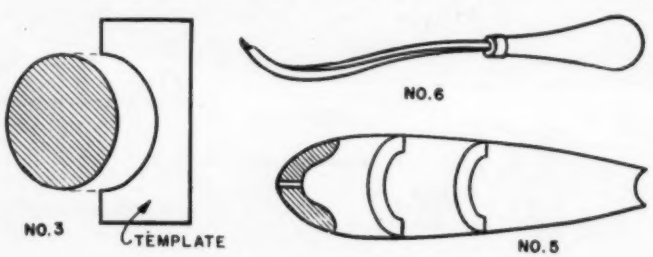
The block is chosen so that it is a little larger in all dimensions than the finished fuselage will be. The first step is to saw the block lengthwise through the middle as shown in Figure 1. The two halves are then glued together, but the sides, x and y, are put face to face this time. This is done because the outside edges of the block are smooth finished from the mill, while the inside faces just cut will be rough and probably none too even.

A small amount of glue is then put on the pieces, as shown in Figure 2, and the two clamped together. If regular clamps are not available, a vise may be used, or the old reliable books resorted to. In any case, be sure that the weight or pressure is applied fairly evenly and the blocks aligned with one another. Do *not* use a lot of glue as it will only lead to grief later. The two blocks must be split apart after the outside shape of the fuselage is finished, and take it from one who knows, it's a tough job to split them apart without damage, if a lot of glue is smeared on.

The carving may commence after the block is well dried, but it is best to allow at least 12 hours for the drying, since, if the block splits apart while the carving is being done, a great deal of time will be needlessly lost while waiting for it to be glued together again. Several templates should be made before the carving is started. One of these is shown at Figure 3, and it is used on both sides of the fuselage at the particular cross section shown, thus enabling the builder to have both sides alike. The templates may be made out of heavy cardboard, and one should be used for about every three inches of fuselage length, where the total length is around 15 to 20 inches. It is often desirable to make more for the nose section, because the shape changes more rapidly there, and then there are often projections such as radiators and the like, which must be accurately shaped.

The rough outer shaping is done with a sharp knife, observing the templates occasionally to be sure that too much is not removed. Coarse sandpaper comes next, followed

(Continued on page 40)



The Fokker E.V or D.VIII, flown by Udet in 1918

The Dornier D.I, one of Fokker's 1918 competitors. It was not used

The Development of the Fokker Fighters

How the Famous Fokker D.VIII Came Into Being and Proved to Be the Outstanding Pursuit Ship of the War

By ROBERT C. HARE

Part No. 15

WHEN German authorities had denied Fokker the right to monopolize production of the Fokker D.VII, they explained such action by saying that they desired his services for purely experimental work.

In spite of reports since the War to the contrary, such action on the part of the Imperial government was absolutely above board; Fokker's genius was desired in order to perfect new and improved designs which could not be accommodated in a factory running at high production speed.

Fokker's first assignment in the experimental field was the Fokker C.I described in part 14. Carried out to the extreme pleasure of the engineering department at Berlin, this design added another feather to Fokker's cap and put him in line for further work.

With production plans for large quantities of the Fokker D.VII, the Imperial Air Force began to scrap some of its old standbys, (Roland D.IV, Albatros D.V, Pfalz D.III, Fokker DR.I, and the Pfalz D.VIII), in anticipation of numbers of the D.VII type. Such a plan of replacement had been extensively undertaken along the Western front. Large aircraft exchange parks had been set up at convenient back area regions, complete mechanical and engineering forces had been accommodated in semi-permanent quarters, and at considerable expense, many new men were taken into factories and trained to replace the experienced men sent out on this refitting program.

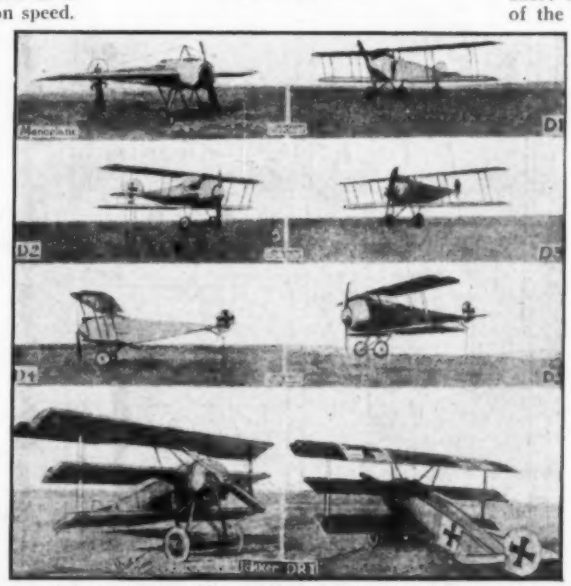
But there was a snag in the von Hoppner plan of air force reconstruction that had not been anticipated. Trouble was being experienced in the contracting factories in the metal type of construction. It was soon found that experienced welders, capable of forming a perfectly welded joint in the steel tubing construction, could not be trained in the short time necessary for the completion of the expansion program. At the same time, engine production had been held up through minor differences among the various motor supply concerns.

Mercedes suffered a great loss to her engineering staff when a group of men left the factory and formed the B.M.W. concern. Orders from the B.M.W. Company drained from the coffers of the Mercedes plant thus creating considerable antagonism.

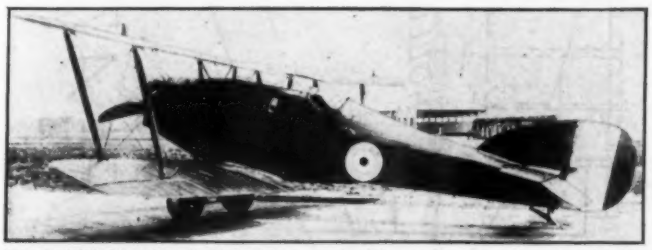
Benz had entered the pursuit motor field at the same time and threatened to offer serious competition in the same line. Argus, Opel and Mercedes-Daimler made the market for motors even more uncertain, to such a degree in fact, that several aircraft concerns began to produce their own engines in order to be assured of a plentiful supply.

Of the aircraft firms thus inclined were the Rumpler Werke, Johannisthal, Berlin

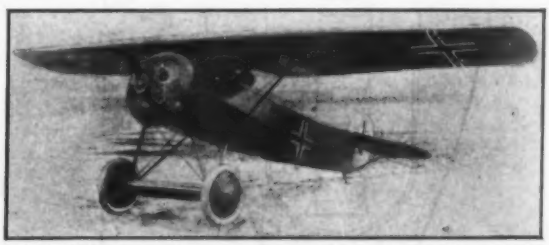
(Continued on page 42)



Top, left to right: Fokker E.IV, D.1, D.2, D.3, D.4, D.5, DR.1. All used before 1918



The British Martinsyde F.4 1918 pursuit ship ready to combat the D.VIII. One of the fastest ships of the War, 147 m.p.h.



A (D.VIII) warming up. Speed, 115 m.p.h., ceiling 22,100 ft. Several squadrons had these before the Armistice

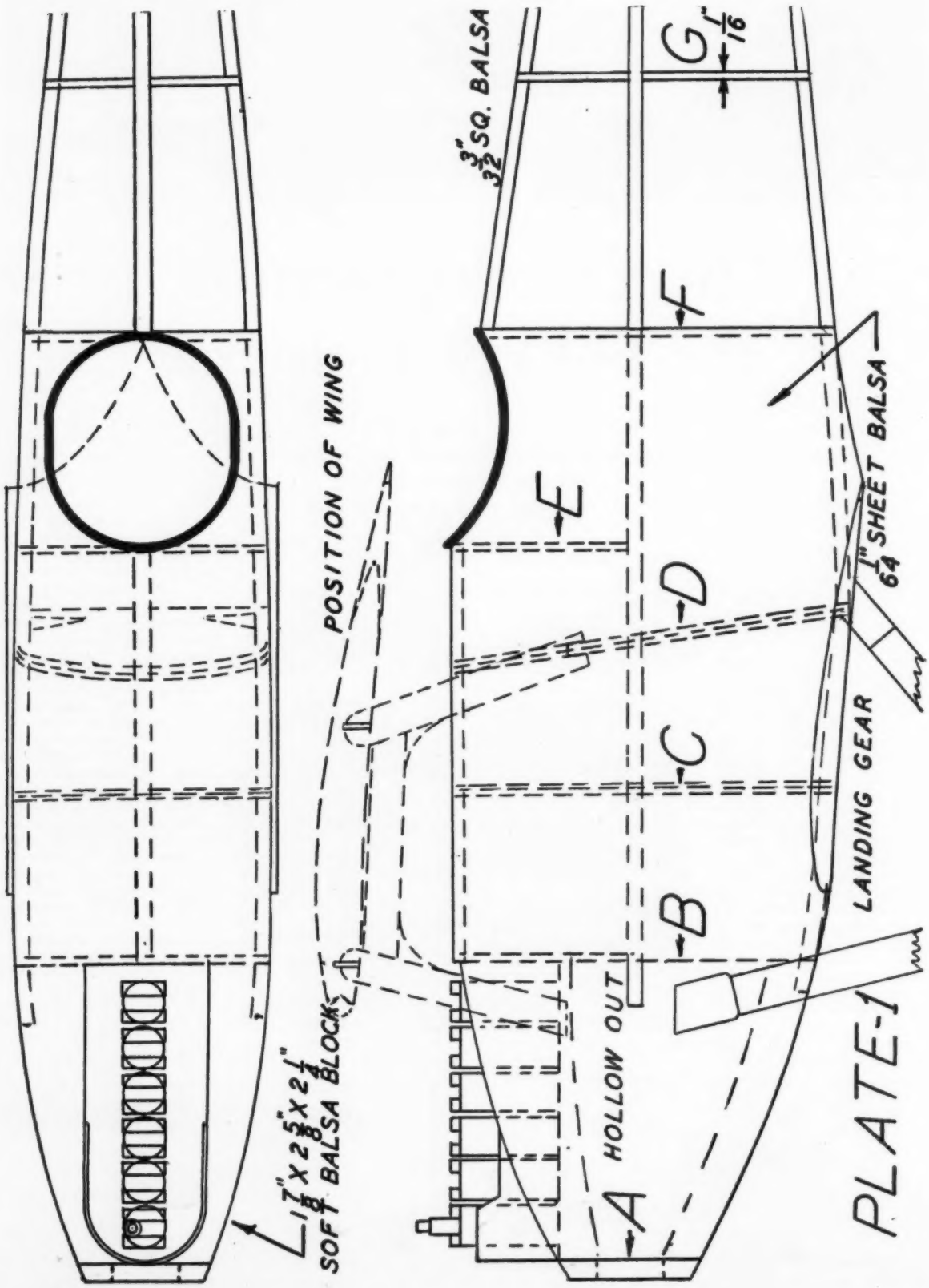
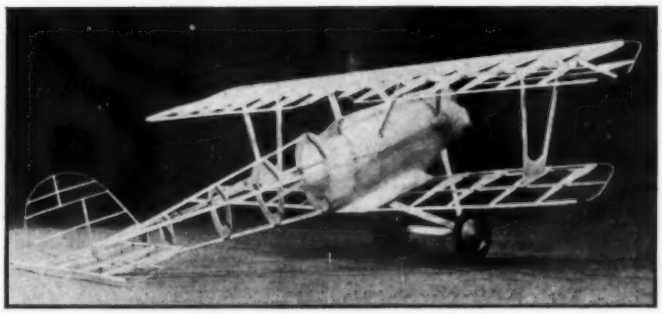
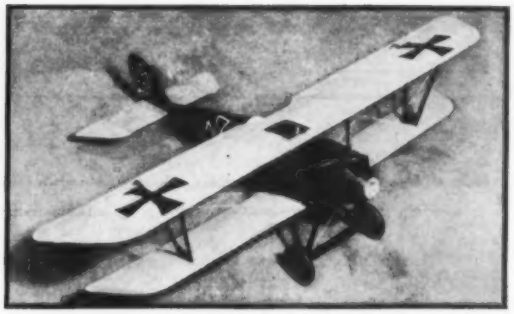

3/32" SQ. BALSA
G 1/16"
F
E
D
C
B
A
POSITION OF WING
1/64" SHEET BALSA
LANDING GEAR
HOLLOW OUT
1/8" X 2 5/8" X 2 1/4" SOFT BALSA BLOCK

PLATE-1



The completed framework shows fine detail



The model completed ready to fly

Build and Fly the Pfalz "Pursuit"

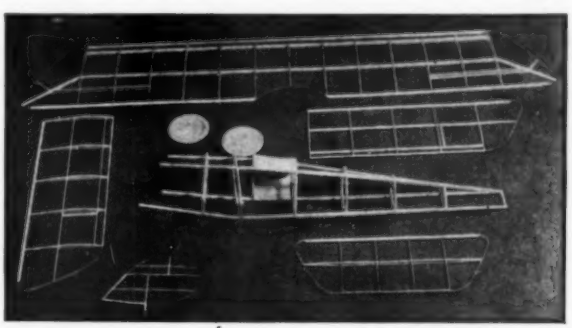
How You Can Construct a Beautiful Flying Model of a Famous German Warplane

By ROBERT V. SMITH

ALONG in 1917, the Germans brought out a very clean-cut biplane known as the Pfalz D-111, a miniature prototype of which is presented herewith in three-quarters inch to the foot scale. With its powerful Mercedes engine of 160 horsepower, this sleek streamlined machine flew at the rate of about 120 miles per hour for its top speed and did around 103 miles per hour at 10,000 feet. The rates of climb were fairly good; it could climb to 5,000 feet in less than seven minutes and could climb from sea level to 10,000 feet in seventeen minutes. As to its flying characteristics, the plane was laterally stable but had a tendency to turn to the left directionally. It landed easily and was not a hard ship to fly, being very maneuverable in combat.

Here it is in full flight

This model appealed to the author because of its comparative scarcity in model circles and general adaptability to being modeled to give an excellent flying scale model. The three-quarters inch to the foot scale is a good one, giving a convenient size. The material won't cost much for the plane and it is well worth while to spend a little time on the Pfalz and then have a lot of fun flying the model. We'll get started right away; here goes for the fuselage.

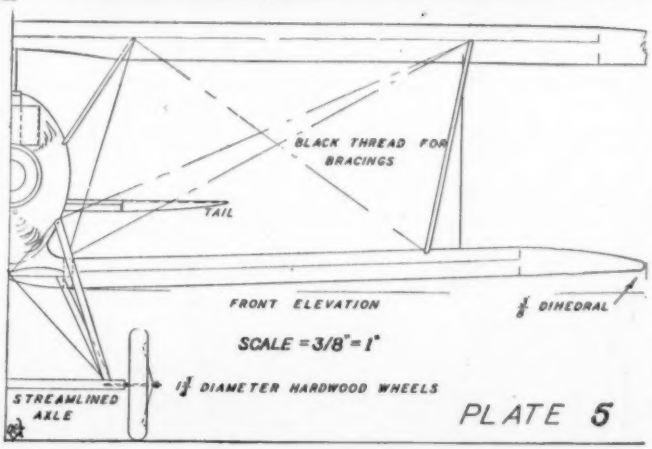


Fuselage

Cut all the fuselage bulkheads from 1/16" medium balsa except numbers C, D and I which are cut from two 1/16" sheets cross-grained to give them additional strength. The nose block is made out of a soft piece of balsa measuring 1 7/8"x2 5/8x2 1/4"; this should be carved carefully and sanded smoothly. Hollow it out but don't make the walls too thin because the model needs the weight up there in order to balance properly. The nose plug "A" fits onto the nose and should have a washer cemented on front for use as a bearing for the propeller.

Select four smooth 3/32" square medium balsa longerons and assemble the fuselage in the usual manner for round fuselage jobs. Use a good grade of model cement for cementing the longerons into the notches of the bulkheads. Two wing root ribs of 1/8" stock are next cut out and glued in place as shown in plate 1; they are glued on the lower ends of formers C and D. Be certain that they are true as the position of the lower wing is determined by them. This next task isn't really as difficult as it looks but does take some patience. Some thin balsa sheets are cemented on formers B, C, D and F; have the pieces overlap only slightly. After this is done, sand the whole job lightly and make sure the joints are all secure. Refer to the photographs for additional information.

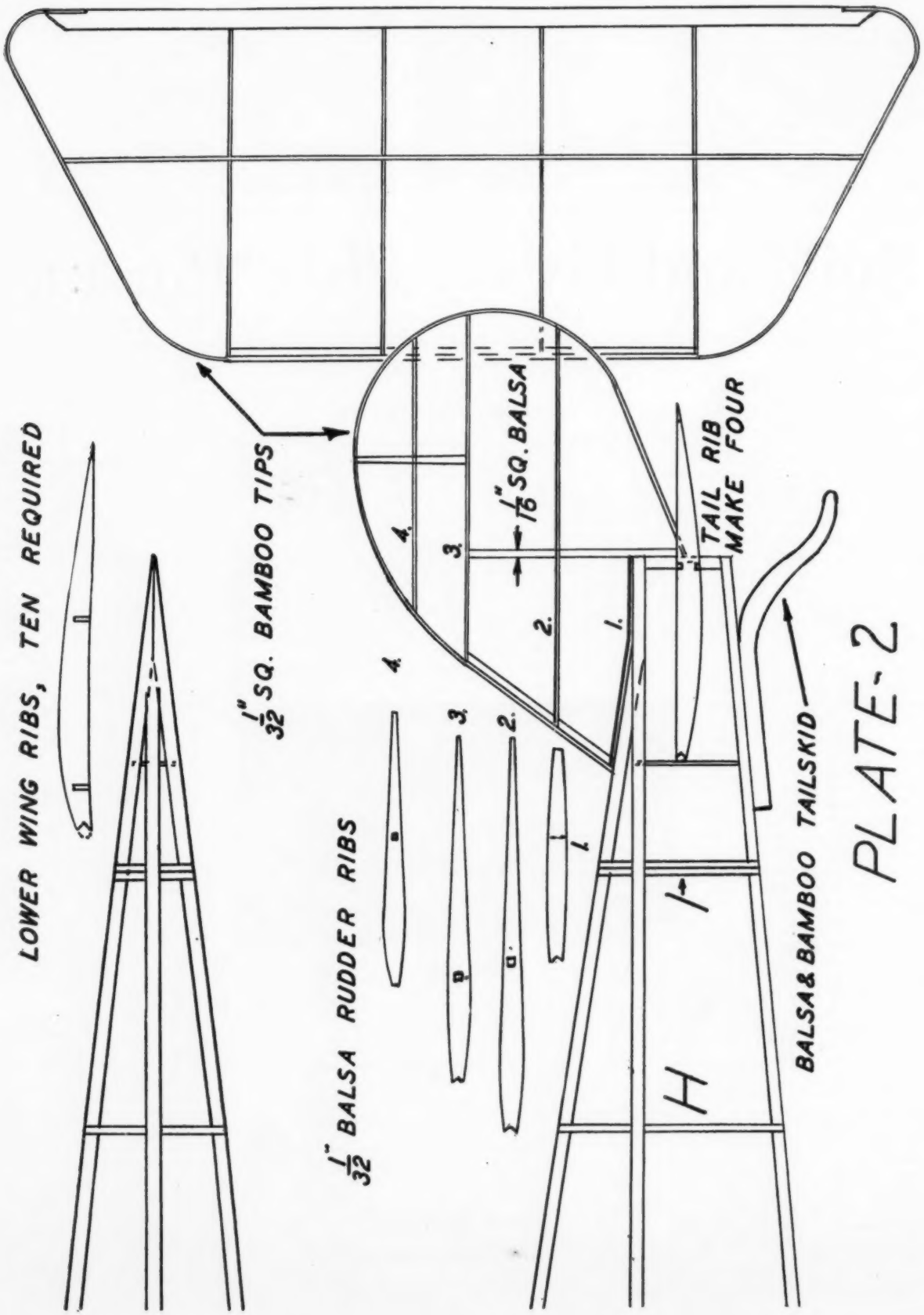
Small balsa cylinders are now cut out and glued in the front block giving the effect of a dummy engine; little pieces of 1/16" square sticks help with the effect. The front shield is made from thin sheet material or metal may be used and this is glued in position. A small triangular piece of wood is put in the rear to support the tail and while you're at the rear of the fuselage, it is a good idea to insert a rear hook. Covering the fuselage may now be done with Japanese superfine tissue, using banana oil as the adhesive. Leave the next to the last section on one side open for access to the rubber and also part of the last section so that the tail can go in easily.

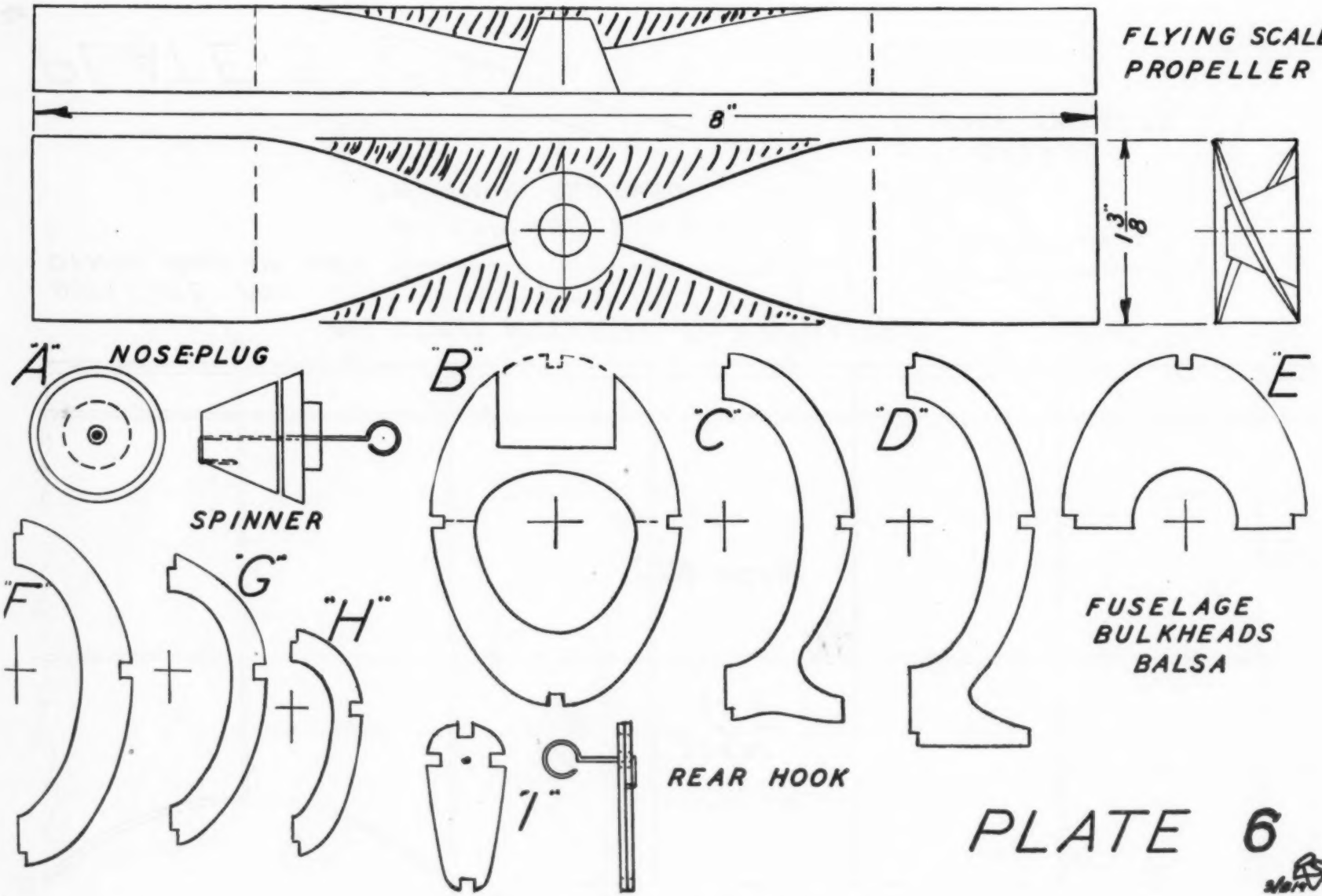


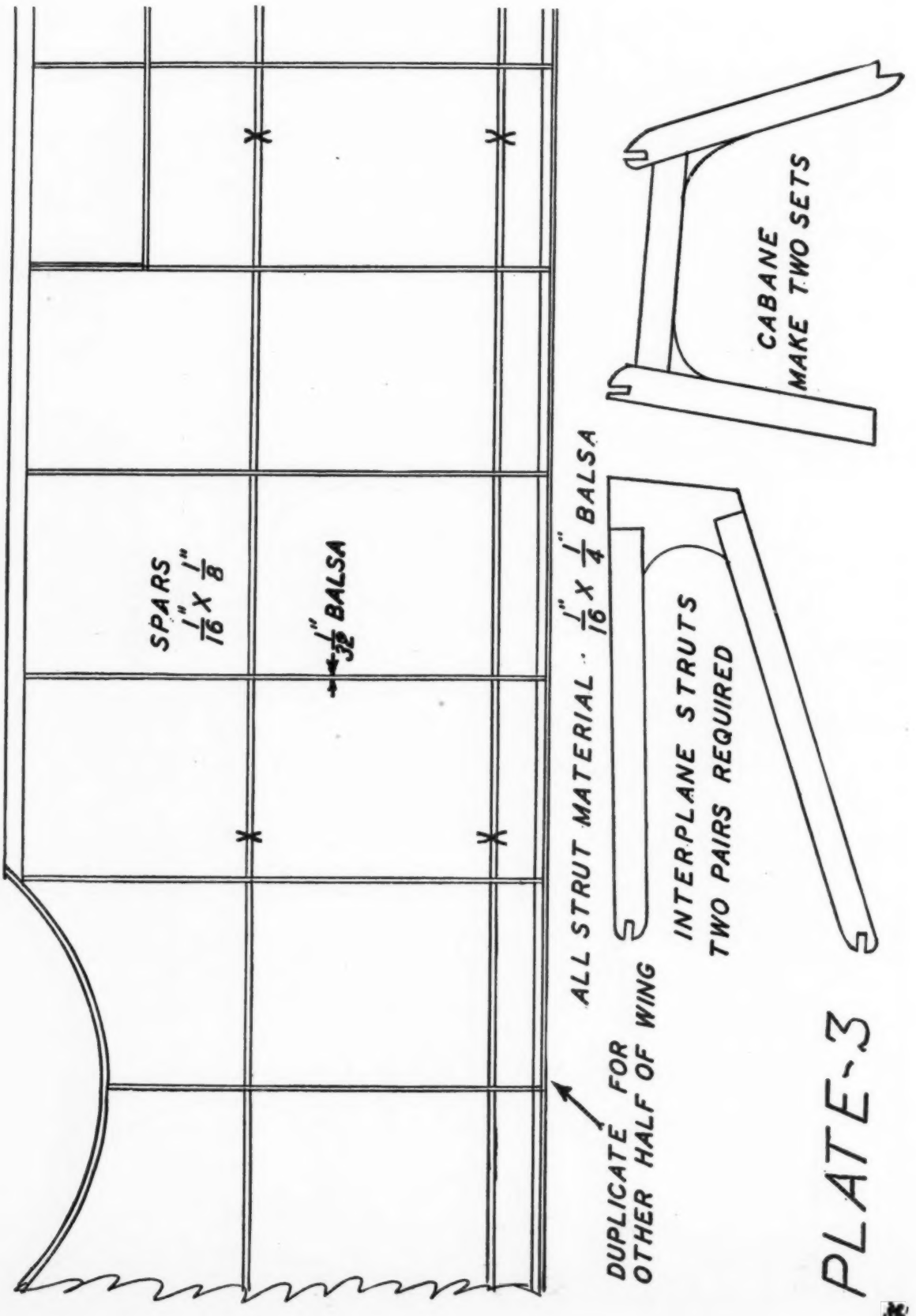
Empennage Assembly

Both the tail and rudder are made in the same manner; the ribs are cut from 1/32" stock and the tips are of bamboo which is 1/32" square or possibly a little less according to the builder's ideas for the strength of the tail. The bamboo is bent in the usual manner by holding it over a candle flame and bending it with your fingers. Leading edges are cut from 1/16" square balsa rounded on one edge and glued in the notches of the

(Continued on page 44)


LOWER WING RIBS, TEN REQUIRED
1/32" SQ. BAMBOO TIPS
1/16" SQ. BALSA
TAIL RIB MAKE FOUR
1/32" BALSA RUDDER RIBS
BALSA & BAMBOO TAILSKID
PLATE-2


FLYING SCALE
PROPELLER
8"
1 3/8"
"A" NOSEPLUG
SPINNER
"B"
"C"
"D"
"E"
FUSELAGE
BULKHEADS
BALSA
"F"
"G"
"H"
"I"
REAR HOOK
PLATE 6


SPARS 1/16" X 1"
1/8
1/32" BALSA
ALL STRUT MATERIAL 1/16" X 1/4" BALSA
DUPLICATE FOR OTHER HALF OF WING
INTERPLANE STRUTS
TWO PAIRS REQUIRED
CABANE
MAKE TWO SETS
PLATE-3

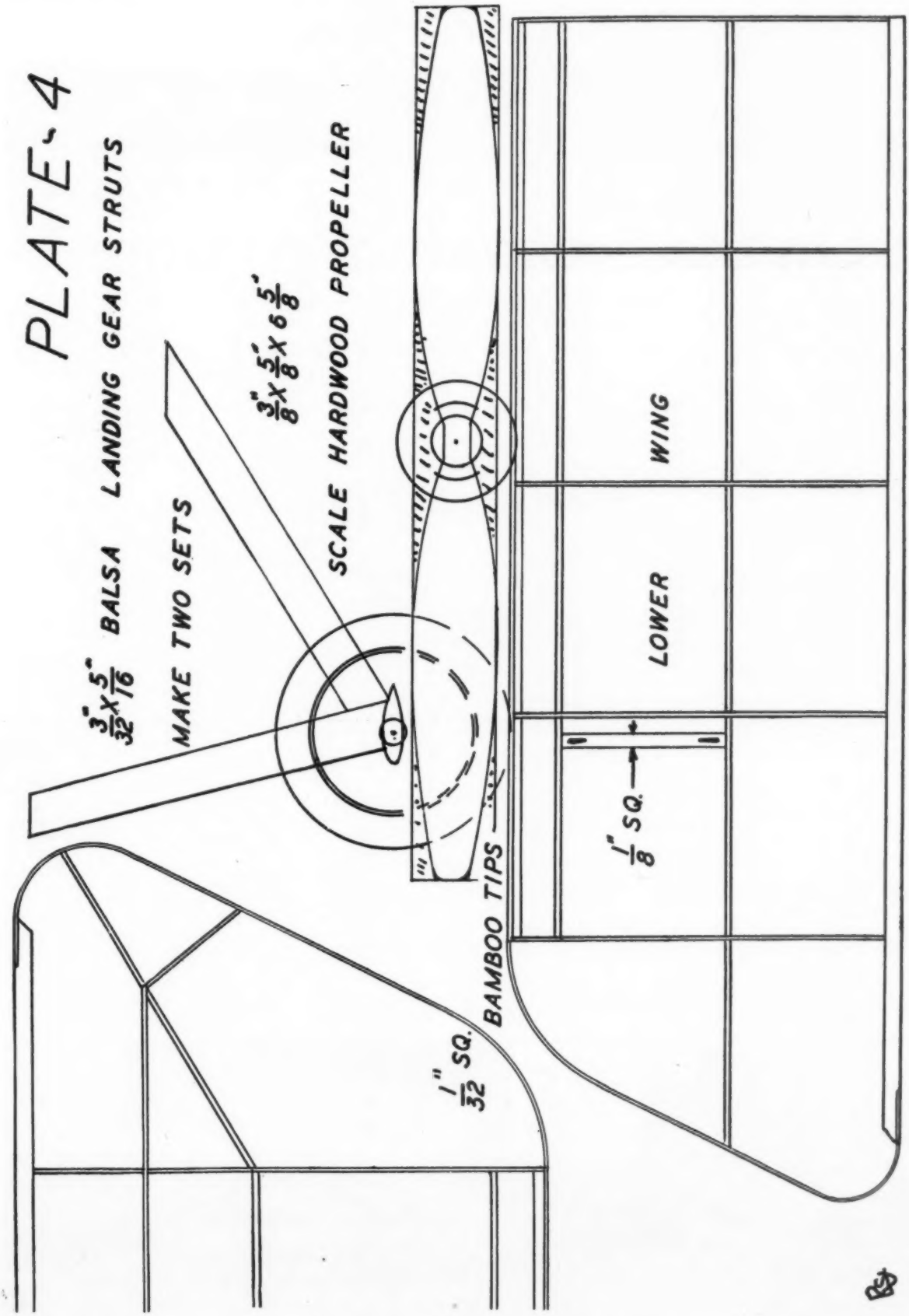
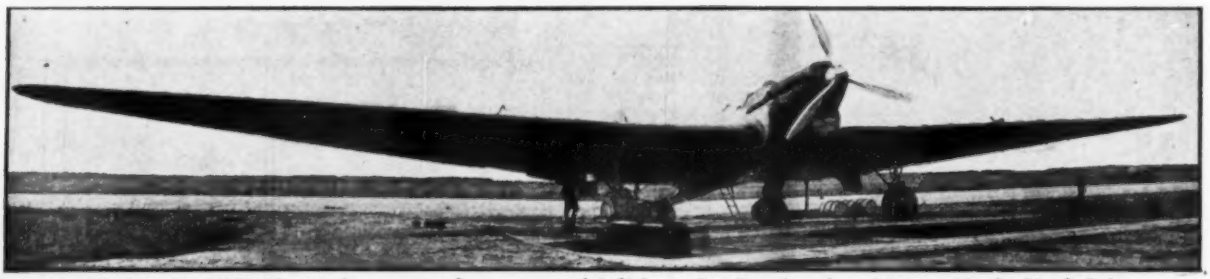


PLATE 4
3/32" X 5/16" BALSA LANDING GEAR STRUTS
MAKE TWO SETS
3/8" X 5" X 6 5/8"
SCALE HARDWOOD PROPELLER
LOWER WING
1/8" SQ.
1/32" SQ.
BAMBOO TIPS



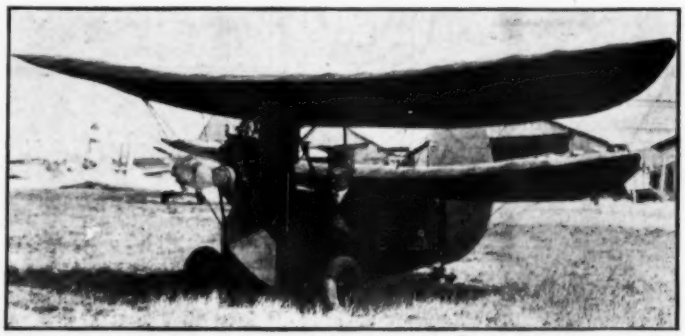
The Russian USSR No. 25 that attempted an unsuccessful flight to San Francisco from Moscow via the North Pole

On the Frontiers of Aviation

Astounding Developments in Military and Commercial Aircraft That Are Increasing Their Safety and Performance. Building the Boeing 299

By ROBERT C. MORRISON

GOOD news still prevails throughout the aviation industry. Among encouraging announcements of great importance in the past month is Eastern Airlines' statement that they have ordered five Whirlwind - powered Lockheed Electras. These are the first Electras to be powered by Wright engines, all others having used the Pratt & Whitney power plants. The Wright Whirlwinds will be of 440 hp. each and are of the new series of seven- and nine-cylinder engines recently developed by the Wright Aeronautical Corp. They will be supercharged to provide a higher power output and will be equipped with the dynamic damper, pressure baffles, and other mechanical innovations which feature the new Whirlwind series.



Here is the "Flying Flea" that has taken Europe by storm. It has two wings, the lower wing taking the place of a stabilizer

Eastern Airlines also expects to have some of the new Douglas DC-3s in operation early next year (see page 15, August issue of M.A.N.). The DC-3s must therefore be well in the course of development. The giant planes will be used in a non-stop service between New York and the South; the smaller Douglas DC-2s for intermediate stops along the same routes, and the Electras for parallel feed work. By parallel feed, one means the stopping at all the small airports along the route to pick up passengers and to unload them at the main terminals where they can make connections with the larger planes for far-distant points. Eastern Airlines' large group of planes is now known as the "Silver Fleet."

North American Aviation, Inc., affiliated with Eastern Airlines, is going to build a new factory in Los Angeles, Calif. The plant will cost $500,000. The company will specialize in Army and Navy construction at the new factory and hopes to have $1,200,000 worth of Army and Navy business. That means many new military planes. They recently received an order from the Air Corps for 42 basic trainers at a price of $559,731.

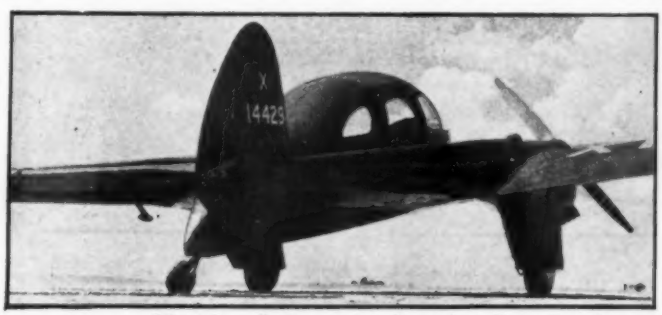
The latest of foolproof sport planes is the one that was recently tested at Dayton, Ohio, with a Ford V-8 engine. It probably was the Aviate, a two-place low-wing ship on the order of the Hammond Model Y. It has its engine in the nose with a radiator similar to that on a Ford car. We shall try to bring you further news of this plane next month as it is the finest "flivver" plane that this writer has yet seen.

A Fairchild Ranger power plant has been used in a special Hall sportplane for the past three years without being overhauled and it still is in very good condition! Mr. Hall, who designed the plane for his own use, has flown it with the same engine for about 300,000 miles without need of repair. The Ranger has recently been put into scheduled production by the Fairchild Company. It is a six-cylinder in-line air-cooled, inverted 145 horsepower engine.

Mystery surrounds the new Northrop fighter that recently disappeared into the Pacific Ocean, leaving no trace of its fate. The newspapers were very consistent in saying that it had a top speed of 325 m.p.h! —and this extraordinary high speed was even acknowledged by high Army air officials. They said that the plane had many new features in design, making such a speed possible. The ship, however, closely followed the specifications of the Northrop Attack now being built for the Army. It had one pilot and two machine-gunners who operated the nine machine-guns in the ship! At a height of 200 feet, the plane could op-

Here is the new Army Grumman XSF-2 with a twin Wasp 700 hp. engine. (Turcich Photo)

The latest Seversky Amphibian SEV-3M-WW. It has a very high speed, powered with a 330 hp. Whirlwind. (Cooke Photo)



The "Crusader," a neat twin engine all-metal cruiser recently developed by the Gyroplane Company

erate successfully at high speed, spreading its deadly bullets and bombs in all directions. In spite of its ground strafing qualities, the speedy Northrop was branded as a pursuit plane. It is therefore very improbable that the newspapers had mistaken the plane for the new attack planes nearing completion and that it actually was a new "mystery ship" for the Army. The landing speed was about the same as our present racers, about 100 m.p.h. The ship was of low-wing design.

We were correct in our recent conjecture when we said that the 135 observation planes being built by Curtiss for the U.S. Navy were of the XO3C-1 type. The first of the planes have been completed and test flown. Some will be equipped with floats and others will have land gears. The plane as a whole is of conventional design. The landing gear is of the full cantilever design as on the Goshawks. Both wings have the same span and are much like those on the Vought Corsairs. The fuselage is monocoque, carrying a crew of two enclosed in a glass cabin that fairs neatly into the tail. It has been stated unofficially however, that Wasp engines instead of Curtiss-Wright Cyclones supply the power in the new ships.

Among other new military aircraft are three giant bombers that recently participated in a strenuous competition for high honors and a large government order at Dayton, Ohio. They are the now popular four-engined Boeing, a new Martin and a Douglas, briefly described in the April issue in "On the Frontiers of Aviation."

The Boeing will be described in the latter part of this article. The Martin bomber is a twin-engined low-wing monoplane of all-metal construction and is of greatly advanced design over former Martins that are now the only modern bombers in our air force.

The Douglas is a twin-engined, mid-wing, all-metal monoplane. Minor innovations were made in its original design after three weeks of testing at Dayton. An interesting feature of the plane is a retractable glass-enclosed gun turret just forward of the tail! When the turret is not in operation, it drops into the fuselage and gives the huge plane a much higher speed. The ship is said to have a cruising range of 3,000 miles with a two-ton load. Eight men make up the crew and operate six machine-guns. Minimum specifications for Army Air Corps bombers are a top speed of 200 m.p.h.; 250 m.p.h. at 10,000 feet; cruising speed of from 170-220 m.p.h.; cruising range of from six to ten hours and a service ceiling of 20,000 and 25,000 feet.

The Farman stratosphere plane that crashed recently after reaching an altitude of 3200 feet. The pilot, Marcel Cogno, was killed

The 1935 Monocoupe 90 has an improved landing gear. The tread has been made 12 inches wider and the center of gravity lowered two inches. A left-hand door is now optional equipment as is a swiveling tail wheel.

Spartan has produced a new sportplane that is now undergoing tests.

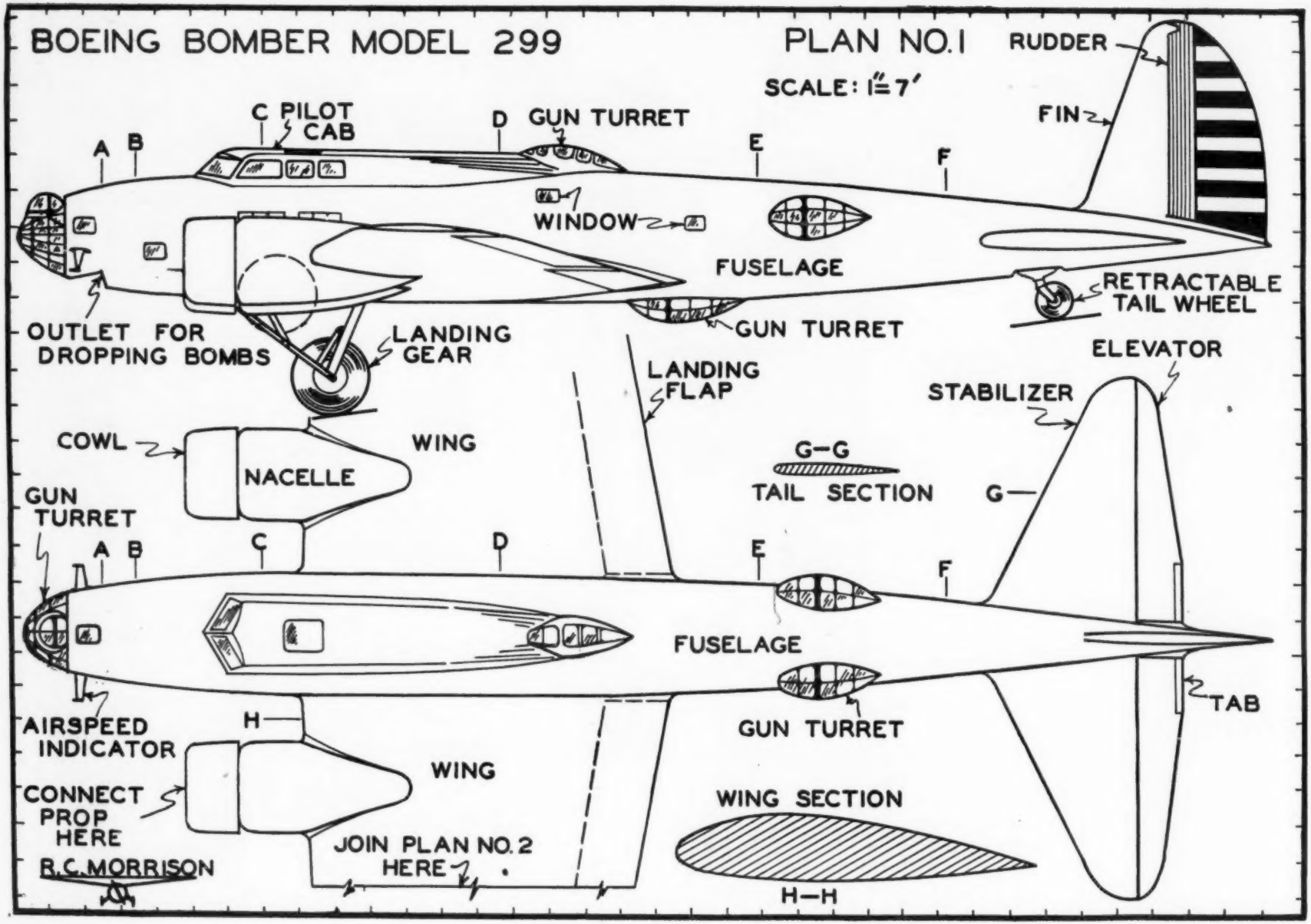
The Shelton "Crusader" that made its public appearance several months ago is now on the market for the sportsman pilot. Thomas M. Shelton, its designer and builder, writes us the following: "Our 'Crusader AG-4' has had considerable time in the air and a parachute has been used only once during the entire time by our test pilot. This was the initial twenty-minute flight. The features of our plane that should most interest the sportsman pilot are the economy of operation, excellent visibility, unusual and distinctive appearance and the ship's ability to fly 145 m.p.h. at 8,000 feet altitude on one engine. It maintains level flight and even climbs quite readily at this altitude (on the one engine.—Ed.). The ship takes off fully loaded under the most unfavorable conditions, such as muddy field, warm day, and no wind at the Denver Municipal Airport (an altitude of 5300 ft.), in a run of 700 ft., and it lands in approximately the same distance. The rate of climb on both engines at 8,000 ft. is 1240 ft. per min.

Both four- and six-place "Crusaders"

(Continued on page 46)

One of the new foolproof airplanes, developed by Waldo Waterman. Note the absence of a tail

The Fahlin Plymo-Coupe powered by a Plymouth motor of 85 hp. using a 2 to 1 reduction gear. (Schmidt Photo)


BOEING BOMBER MODEL 299
PLAN NO.1
SCALE: 1"=7'
RUDDER
FIN
C PILOT CAB
D GUN TURRET
A
B
E
F
WINDOW
FUSELAGE
RETRACTABLE TAIL WHEEL
GUN TURRET
OUTLET FOR DROPPING BOMBS
LANDING GEAR
LANDING FLAP
ELEVATOR
STABILIZER
COWL
NACELLE
WING
G—G
TAIL SECTION
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GUN TURRET
A
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C
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E
F
FUSELAGE
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AIRSPEED INDICATOR
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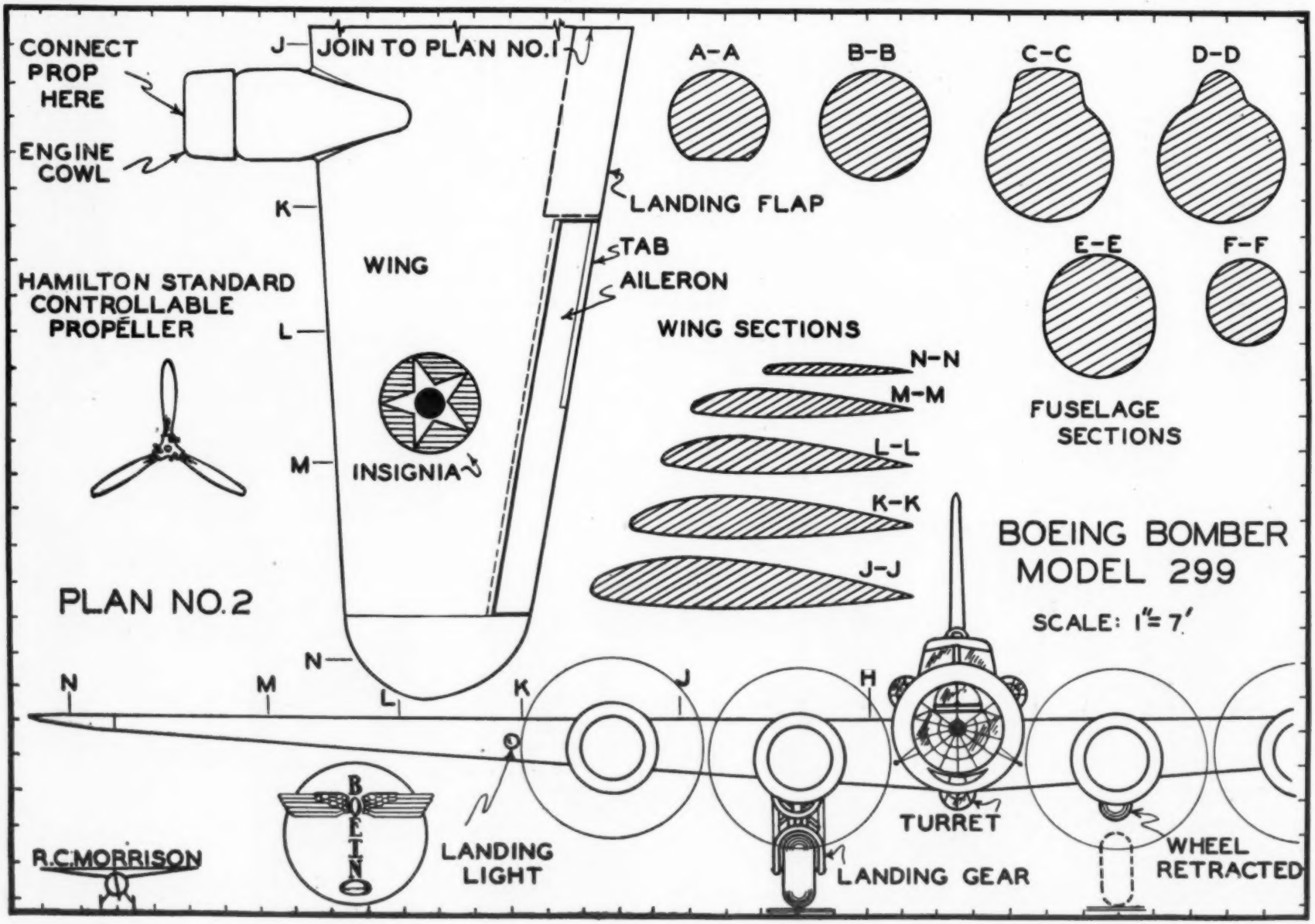
JOIN PLAN NO.2 HERE
H—H
B.C.MORRISON


CONNECT PROP HERE
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B-B
C-C
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F-F
FUSELAGE SECTIONS
WING SECTIONS
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J-J
PLAN NO.2
BOEING BOMBER MODEL 299
SCALE: 1"= 7'
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H
TURRET
WHEEL RETRACTED
LANDING GEAR
LANDING LIGHT
BOEING
R.C.MORRISON

AIR WAYS
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

Photo of a painting, "Boeing 247", by David Keller

Pict. No. 1. A model Boeing F4B-4, by George Meese. It contains 2413 parts, requiring 260 hours work

Pict. No. 5. J. H. Liebegott has prepared his "Moth" for the winter snows. It is fine-looking and flies well

Pict. No. 4. A neat gas job built by Lawrence Loftin, Jr., Alta Vista, Va. Only short hops with it have been tried so far

Pict. No. 2. Here is a 24-ft. glider which Bob Morse had built to his design. He has made many flights in it which, he says, were the most thrilling experiences he ever had

Pict. No. 3. Jim Walker with his Jimmie Allen racer with which he won the Jimmie Allen Contest

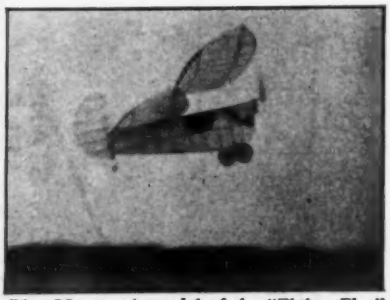
Pict. No. 6. A Hanriot-Biche pursuit ship built from plans in Model Airplane News by E. Liddycoat

IT IS the purpose of this column to bring together from all parts of the world, readers of MODEL AIRPLANE NEWS in a mutual exchange of ideas. Air Ways, probably more than any other factor in the magazine, is helping to spread the art of model airplane building. We hope that readers will take advantage of its publication each month to send pictures and information showing what they are doing in model work, so that their knowledge and experience may be passed on to others. All of this helps to advance aviation and provides a means of future transportation which will be a blessing to all of mankind.

There seems to have been a "dark horse" among us for some time. It is only because of his modesty that we have not known of his work. One of the important departments of the aviation industry is to depict ideas in a realistic manner, especially with regard to the sales end of the business. David Keller of 3706 Georgia St., San Diego, Calif., who was one of the winners in the Airplane Observers Contest, is a very fine artist. He has turned his talents to aviation. To show how advanced he is in aviation art, Elbert J. Weathers has "spilled the beans" and has sent us a photograph of one of his paintings. This appears as the heading of our Air Ways column. You will recognize it as a picture of the Boeing 247. Your examination of it will confirm that it is difficult to determine whether or not this is a picture of an actual machine or just a painting. We wish all the luck in the world to David Keller in his future career in aviation.

The picture of one of the finest models that we have received this month is picture No. 1, which shows a Boeing F4B-4, constructed by George Meese of 323 Karl Court, Dover, Ohio. This little ship is perfect in every detail. It required 260 hours to complete and contains 2413 individual parts. It is regrettable that we merely have to present a picture of it for our readers to examine. This model should be of interest to every aviation fan. Meese expresses his desire to contact model builders who are interested in trading plans; possibly you can arrange an exchange to mutual advantage.

Bob Morse of 2321 Loma Vista Place, Los Angeles, Calif., deserves considerable mention for his recent work with a man-carrying glider, which is shown in picture No. 2. He says, "I had it built for me and it carried out several of my ideas. It weighs 135 pounds and was flown by running off the top of a hill against the wind. It is the closest thing to human flight there is, outside of the web-wing, parachute-jumping "human bird," that has caused such a sensation lately. I managed to get it up fifteen feet from the top of a small hill and flew it for a hundred and fifty yards. It has controls the same as other gliders, except that the ailerons and rudder are con-



Pict. No. 8. A model of the "Flying Flea" in flight, built by M. Vincre of the Model Air Club of France

nected together. The greatest thrill is taking off and landing on your feet. Due to its excessive weight, I had trouble in getting flying speed, which was twenty miles per hour, and cracked up several times. The flying of it was thrilling and as soon as I am able I will build another one which will be much lighter. The ship has a span of twenty-four feet lower wing, twenty-two on the upper and a chord of fifty inches. It has seven degrees in dihedral, which we found to be too much. The fellows who built the ship for me told me that, but I did not believe them."

Pict. No. 9. Hiroyasu Minowa, leader of a large group of Japanese model builders with his flying No. 91 Jap Fighter

What Morse says is true. Flying a glider of this type is far more thrilling than riding in an airplane. Often, however, considerable difficulty is encountered in taking off properly, and in housing the machine, considerable space is required. We hope to hear more about Morse's future flights.

Picture No. 3 shows Jim Walker of 1028 Rural St., Emporia, Kans., holding the Jimmie Allen, Jr., trophy and plane with which he won the Jimmie Allen Contest. He made a time of one minute, fifty-seven seconds, which was not as good as expected because of a strong thirty mile per hour wind which swept the field. Under these conditions we would say that the performance of the little ship was excellent.

Lawrence Loftin, Jr., of Alta Vista, Va., has been a model fan for a number of years. His chief means of sustenance mentally and physically is aviation. Being rather lean by nature under these conditions, he decided to attend Mr. Grant's camp at Vermont, at which place he hoped to obtain a great amount of aeronautical nourishment. It appears that his expectations were not in vain, for in picture No. 4 is shown a gas job which he recently completed while at the camp. However, before complete tests could be made, it was necessary for him to return to his home. The ship was well built and is a nice-looking job. We hope we will hear something later of Loftin's activities in this line.

The time is approaching when model builders will have to make their ships for winter flying. Picture No. 5 shows J. H. Liebegott's "Moth," which he built from plans in Model Airplane News and which he equipped with skids for winter activity. Liebegott tells us that the ship performs very well, rising off the snow and flying beautifully. Here is an idea for some of our ambitious readers. Liebegott lives at 201-06 109 Ave., Hollis, N. Y.

MODEL NEWS FROM OTHER COUNTRIES

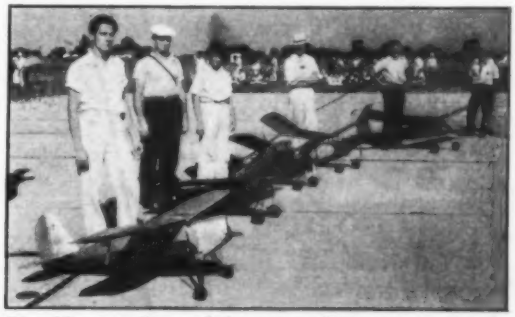
Canada

Canadian boys have been more active during the past season than at any time in the past in regard to model flying. We recently received a letter from E. Liddycoat, Secretary of the Model Aircraft League of Canada. Mr. Liddycoat's address is 61 Primrose Ave., Hamilton, Ont., Canada. He undertook to build the Hanriot-Biche model, plans of which were presented in our magazine some time ago. Picture No. 6 shows the completed ship. He says it is a very fine flier and gives excellent performances. This model is probably one of the most unique models Model Airplane News has ever presented. It is different inasmuch as it is a pusher. Readers will find it interesting to build and fly this ship.

A letter also comes from Gordon Hempstoch, Vice-President of the "Billy Bishop" Chapter of the League. Mr.

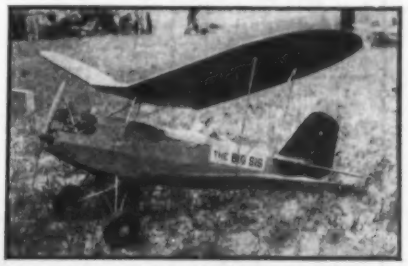
(Continued on page 34)

Pict. No. 7. The "Billy Bishop" chapter of the Model Aircraft League of Canada. Fred Ward is president



Pict. No. 10. Some of the gas model entrants and their fiery steeds at the American Legion Contest at Indianapolis

Pict. No. 14. Leo Vartanian (left) and his model which won third place at the Junior Birdmen Contest



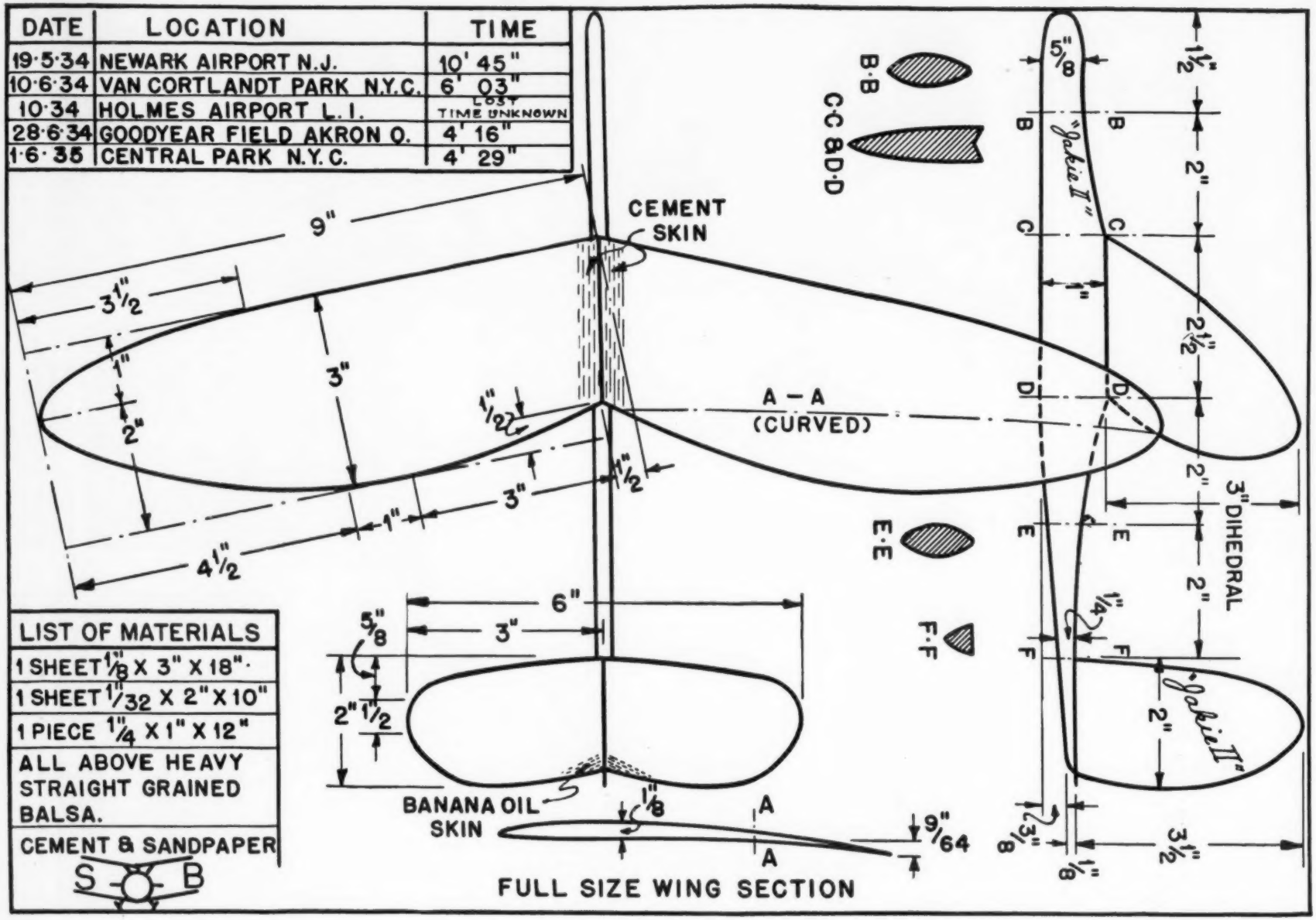
Pict. No. 12. The only biplane at the J. B. Contest, built by Robert Watson. It flew well and could take rough landings

Pict. No. 13. Ben Shereshaw's monocoque gas job at the Junior Birdmen Contest. It is beautifully built and highly streamlined

Pict. No. 11. Lawrence Harlow with his model helicopter with which he won the experimental event at the American Legion Contest

Pict. No. 15. While spectators watch gas jobs fly out of sight, Joe Kovel tanks up his engine for a flight of the KG-1, in the foreground

DATE	LOCATION	TIME
19·5·34	NEWARK AIRPORT N.J.	10' 45"
10·6·34	VAN CORTLANDT PARK N.Y.C.	6' 03"
10·34	HOLMES AIRPORT L.I.	LOST TIME UNKNOWN
28·6·34	GOODYEAR FIELD AKRON O.	4' 16"
1·6·35	CENTRAL PARK N.Y.C.	4' 29"



LIST OF MATERIALS
1 SHEET 1/8" X 3" X 18"
1 SHEET 1/32" X 2" X 10"
1 PIECE 1/4" X 1" X 12"
ALL ABOVE HEAVY STRAIGHT GRAINED BALSA.
CEMENT & SANDPAPER

Applying Power to Gain Duration

Factors of Model Airplane Design That Affect Duration of Motor Run and How They May Be Used to Obtain the Best Results. Partial Summary of Chapter No. 4, of "The Aerodynamic Design of the Model Plane"

By CHARLES HAMPSON GRANT

THE purpose which governs the design of at least ninety percent of the contest model airplanes at the present time is *duration* of flight. In practically every event at all contests, model builders compete for honors in this phase of model flying, using every bit of knowledge at their command to induce their ships to leave terra firma and stay away from it for as long a time as possible. The progress made in this art since the early days when fifteen seconds was the world's record, is almost unbelievable. Now (1935) a rubber-powered fuselage model holds an official world's record of over forty-one minutes while there have been any number of other flights unofficially timed that have exceeded this duration.

Much of the skill with such planes has developed through a system of "cut and try" methods; trying first one type of design and then another. As an example of this condition, consider the phase in a model builder's life which is dominated by the mistaken idea that gears and multiple motors will increase the flight duration of his "brain child." Invariably the idea is finally exploded and the disillusioned experimenter comes to realize that duration does not come from complication or multiplication of parts but rather from *accurate* simplicity; from correct design and good workmanship. To a large extent, efficient application of power has considerable to do with flight duration, although other factors enter the problem. In order that the model designer can clearly see the effect and importance of each factor in securing "duration," a formula is given below which has been developed and tested through traveling the road of practical experience, with mathematical theory used as a guide and checker. In it the relationship of the various quantities to one another are shown. The formula for *duration of motor run* is as follows:

$$E = K \frac{PAL}{N} \sqrt{\frac{a(\Pi D)\,[(\Pi D)^2 + P^2]}{W}}$$

In the formula, (E) represents motor run *duration* in seconds, (P) the propeller pitch in inches, (A) the wing area in square inches, (L) the length of the rubber motor in inches, (N) the number of strands of rubber composing a motor, (W) is the weight of the complete model in ounces, (D) is the propeller diameter, (a) is the propeller blade area in square inches, Π is 3.1416, and (K) is a constant that varies with the use of different size and quality of rubber and methods of winding the motor. Many builders will not know how to determine the value of (a). For their benefit, if the area of the propeller blades is not known, the following formula will give it in terms of the depth, width and length of the block from which it is cut, when the method of diagonals is used. (For further explanation of this system and its application, see page 46 of the June 1932 issue of MODEL AIRPLANE NEWS.

$$a = \frac{(\sqrt{d^2 + w^2}) + d}{2} \left(0.8\right) D.$$

In the formula, (a) represents the effective blade area of a *two-bladed* propeller. To find the area of a four-bladed propeller, multiply the value derived for (a), by two (2), and for a three-bladed propeller, by one and one-half, (1.5). (d) represents the *depth* of the block, (w) the *width* of the block and (D) its length.

Insert the value of (a) calculated from this formula, in the formula for motor run duration, (E).

The duration formula for (E) may be solved for various sizes and types of rubber strands by inserting the corresponding numerical values of (K), following. For dry rubber wound without stretching, 1/8" x 1/30" size strands used, K = (.00002).

For 3/32" x 1/30" strands K = (.000031),
For 1/16" x 1/30" strands K = (.000042),
For 1/32" x 1/30" strands K = (.000084).

When motors are lubricated and stretched when wound, multiply each of the above values of (K) by (2.2). For instance for 1/8" x 1/30" strands (K) = (.00002) 2.2 = (.000044).

As these figures give the motor run duration only, the actual duration of flight will be considerably greater due to the time of the glide, or to time during which the model is soaring on stray air currents. This time cannot be figured accurately as air conditions are never the same on any two different flights. Usually the total duration will be proportional to the number of strands used on any particular model, provided all other factors are kept the same.

Suppose we consider the factors in the formula in regard to how they affect the running duration of the motor or in other words, the amount of time during which the propeller is turning. In reading the formula for the effect any factor will have on the duration, simply remember that as the factors in the numerator (above the division lines) *increase*, or the factors in the denominator *decrease*, the duration run of the motor *increases*. If the factors in the numerator *decrease*, and the factors *increase* in size in the denominator, the duration will be less. The amount that any factor affects the duration is determined by the power of the factor. If any factor is squared in the formula, its effect on the duration run is large: less if it is only of the first power, like (A) or (N), and still less effective if the square root of the factor is to be taken, as $\sqrt{W}$.

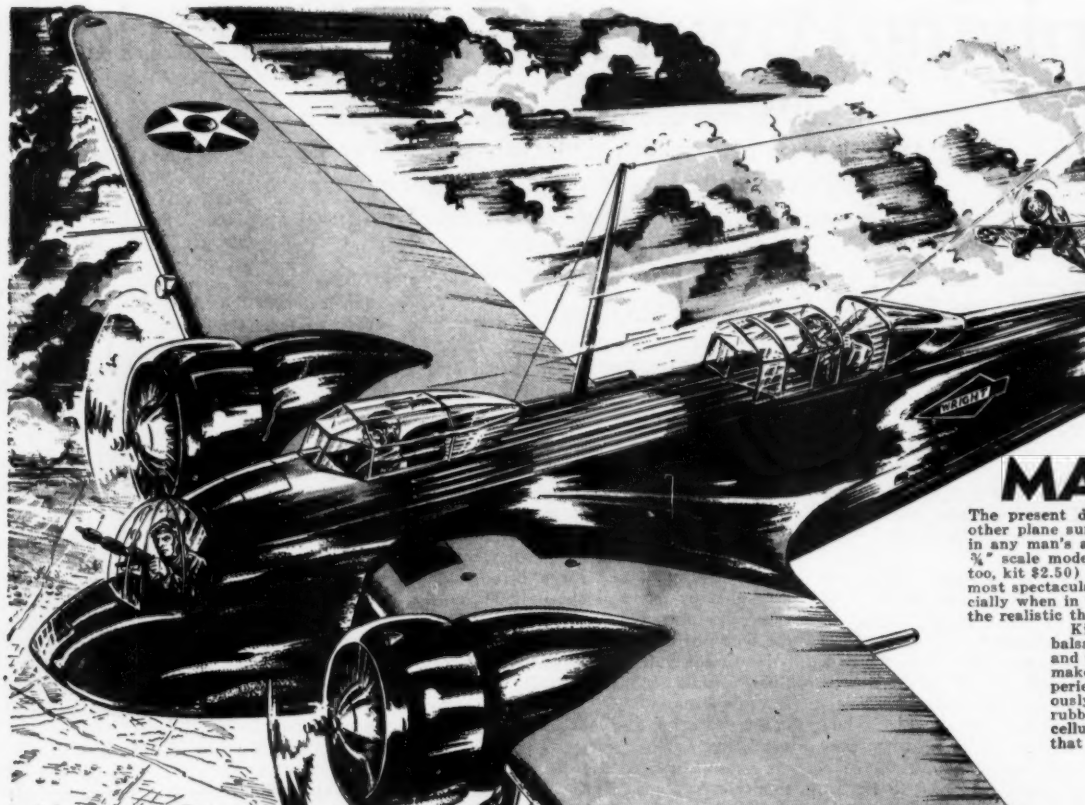
Under these conditions it is apparent as to what increases and what decreases duration. First of all the larger (K) the constant is, the greater the motor duration. Also (E) increases or decreases directly as P, A and L, and inversely as (N). In other words, if the pitch (P), the area (A) or the length of the motor (L) is doubled, the duration will be twice as great provided no other factors change. If the number of strands in the motor are doubled, the total weight (W) and all other factors remaining the same, the duration will be only half as much.

A good rule to follow in order to improve the duration of propeller run is to *increase* the value of wing area, the motor length and the propeller diameter, pitch and area *relative* to the weight of the model and the number of strands used. These two latter factors should be kept as small as possible.

There is one other factor which affects the duration motor run, which cannot be calculated without great complication. It is the efficiency or lift drag ratio of the ship. The greater the total drag is, the more strands you will have to put into the motor in order to develop a greater amount of thrust to overcome the larger resistance. Thus (N) in the formula will be larger and the duration (E) consequently will be smaller. The formula given here gives the motor run duration for a model *when in flight*, with single surface medium camber wings, and of normal design and construction. It is not accurate to the fraction of a second because of the several variable factors involved that cannot be calculated without great complication. However, the formula will serve as a basis of comparison and as a guide to the proper model factors to increase or decrease.

With double surface cambered wings employing an efficient aerofoil section, the motor run will actually decrease as the total resistance of the ship will be reduced and consequently it will fly faster. This, in turn will cause the propeller to turn faster and the motor to unwind more quickly. However, much greater lift will be obtained, the model will climb higher and have an ensuing longer glide. Actually, the total *flight duration* should be much greater. Another way to take advantage of more efficient wings is to reduce the amount of rubber used in proportion to the increase in efficiency. After everything possible has been done to increase the duration of motor run by changing the factors contained in the formula, the only remaining procedure is to reduce the drag of the airplane by the use of efficient wings and tail surfaces

(Continued on page 45)



Build this MARTIN BO

The present day sensation in U.S. Army Aviation. No other plane surpasses the prototype in performance in any man's air service. The model kit up to 3/4" scale model (and the 1/2" scale da... too, kit $2.50) for its amazing wealth of detail m... most spectacular appearing designs pro... in m... cially when in the air, with its two mo... owe... the realistic three men visible at their ... ns.

Kit for the Martin Bombe... ludes balsa strips and every last p... accu... and these printed parts actu... ill fi... make a complete airplane, ... ess perience with kits other th... D's ously. Turned wheels and ... front rubber, tissue, wire, scale pro... bl... celluloid, washers, etc., etc., ... ual that goes with the 53" stand... 3/4" s... all the necessary ... ls. postfree, $8.50.

The Dwarf kit to build this is just up the completed job but ... does striping tape, and while it ... has special parts already made ... has the cockpit as does the ... Tra... same price of $2.50 less ...

Every One of These 31 Astonishingly Real Models Is Also Available in 1/2" Scale Size, Called

C-D "DWARFS"—the Most Talked About Models of the Year!

These models are probably the finest little models you will ever see in your lifetime. They are precisely like those wonderful and famous 3/4" scale C-D's described above with but few minor exceptions—very few, in fact. We don't believe there are a total of six of these minor changes or simplifications in the entire line of 29 small Dwarfs, except in the D-35 and D-45 there is a considerable amount of change necessary because of the extremely large size of the models and of course putting in movable controls would make a little additional change for the movable "works" necessary in the internal structure.

Listed here, in addition to the names and prices of the Dwarfs you will note only the span is given. For length, simply take 2/3 the length of the 3/4" scale model and the coloring we suggest is the same as is supplied with 3/4" scale models.

If you wish to order coloring right with the model, only 1/2 oz. of each of the two or three main colors, usually listed first, and paper cement and balsa cement will be needed. On the larger models (over 15" generally speaking) and for those who do not have much experience, perhaps a 1-oz. bottle of all liquids should be ordered, except for small numbers up to 35c.

DWARFS are "dry" kits. No Liquids are Included.

A 15c packing charge when dopes are ordered **must** be included beyond the 10c packing charge you must aend for each Dwarf kit ordered up to the amount of five. When six or more "Dwarfs" are ordered no packing charge is necessary, thereby saving you 60c or more! Kits D35 and D45 require at least 2 oz. of all liquids except 4 ozs. gray for D35.

It's inexpensive to build formations with Dwarfs, too!

"Why—O-o-h-why did I buy that kit!!"

We've also bought other kits ourselves and know just how a model builder feels when he's seen a pretty picture of a model, sent for the kit—and then found he'd been duped. If you've never before dealt with the company from whom you intend buying, ask other experienced model-builders about it. Yes, ask them about us, too! They'll undoubtedly tell you, as we've always said, that all C-D photos and sketches show models just as they WILL look when built from our super-complete kits **without** extra materials (except for liquids in Dwarf kits and these are HONESTLY advertised as "Dry" kits for our policy forbids saying or even leaving open for speculation that kits are complete when they're not!)

Here's The Complete Line of Dwarf Models

SINCE 1/2" AND 3/4" SCALE C-D KITS BUILD UP PRECISELY THE SAME BEAUTIFUL MODELS SIMPLY REFER TO ILLUSTRATIONS ABOVE UNDER CORRESPONDING NUMBERS.

No.	Name	Span	Price
D- 1	Gr. L. Sport. Trainer	13 1/4	$ .65
D- 2	Tr. Air. Mystery Ship	14 1/2	.50
D- 8	Army Boeing P12-E	15	.65
D-11	A-W Quad Fighter	14	.45
D-14	Fokker Triplane	11 3/4	.45
D-15	Fokker D-7 Fighter	14 1/4	.60
D-17	Bayle's '31 Gee-Bee	11 3/4	.50
D-18	Howard "Pete" Racer	10	.30
D-19	Supermarine S.6B	14 7/8	.55
D-20	Hawker Fury Fighter	14 7/8	.45
D-21	Hawk P6-E Fighter	15 3/4	.75
D-23	Boeing P-26 Fighter	13 1/2	.55
D-24	Lockheed Vega	20 3/4	.85
D-26	Heath Parasol Sport	15 3/8	.35
D-27	Doolittle's Gee-Bee	12 3/8	.50
D-28	Monocoupe Sportplane	16	.45
D-30	Boeing F6B-3 Fight	15	.65
D-32	Boeing 95 Mailplane	22 1/4	.65
D-33	Comper Swift Lightpl	12	.30
D-35	Boeing 247 Transport	27	2.50
D-36	Lincoln Sportplane	10	.35
D-37	Waco C Cabinplane	16 3/4	.75
D-40	Aeronca C-3 Sport	18	.60
D-41	Vought Corsair Fight	18	.85
D-42	Howard "Ike" Racer	10 3/8	.25
D-43	Douglas O-38 Obs	20 1/2	.85
D-45	Martin Bomber	35 3/8	2.50
D-46	Laird Solution Racer	10 1/2	.50
D-47	33 Wedell's W. Wms	13	.50
D-48	34 Turner's W. Wms	13	.50
D-49	Curtiss F11C-2	15 3/4	.45

When ordering please remember these are "Dry" kits (no liquids included.)

BUILD REAL FLYING MODELS

AMAZING AUTHENTICITY AND A WEALTH OF DETAIL HAVE MADE C-D ¾" SCALE FLYING MODELS FIRST CHOICE OF AMERICA'S "BIG SHOT" MODEL BUILDERS

Thousands upon thousands of model builders, not only in the United States but in over 60 countries throughout the world as well, proclaim C-D models "the finest ever." If you were to go to the "ends of the earth" you could not possibly duplicate any C-D model for design, completeness of kit or quality of material. We know for these reports are brought to us by letter from every point on the globe where model airplanes are built and through the many magazines which reach us from all these points as well.

The best thing about them however, is that they do really build the models just as we have pictured them below. Even though the pictures are tiny, they do show the wealth of detail and the beauty made possible due to C-D highly engineered drawings, which only 16 solid years of experience **under the same management** can produce. In this light, we are the oldest concern within the United States and the world's second oldest. Pick out your C-D and send for it today! Become a real model builder!

The Great Lakes Sport Trainer
Span 20", length 15¾". Beautiful flights. Easy to build. Orange and cream. Kit SF-1, $2.65.

Famous Travel Air Mystery Ship
Span 21¾", length 14¾". Swift flier. Rich in detail. Red, black scalloping, green trim. Kit SF-2, $2.95.

U. S. Army Boeing P12-E
Span 22½", length 15¾". Excellent army model. Yellow, olive drab with red trimmings. Kit SF-8, $2.85.

English A-W QUAD Fighter
Span 23⅛", length 18⅞". Unusual four-flying type. Easily built. Red, white and blue. Kit SF-11, $2.50.

Von Richthofen's Fokker Triplane
Span 17¾", length 14⅛". Famous war model. Authentic coloring. Red, silver and white. Kit SF-14, $2.50.

Beautiful Fokker D-7 Fighter
Span 21¾", length 17". Rich in details. Orange, green, white, black details. Kit SF-15, $2.95.

'31 Air Race Winner—Boyle's Gee-Bee
Span 17⅞", length 12". Speedy flights. Beautiful lines. Yellow and black. Kit SF-17, $1.95.

Schneider Winner — Supermarine S6-B
Span 22¾", length 21¾" overall. Many unusual features. Will R.O.W. Silver and blue. Kit SF-19 $3.50.

The Swift Howard Racer "Pete"
Span 13", length 13¾". Excellent flights. Easy to build. All white, black details. Kit SF-18, $1.95.

Hawker Highspeed Fury Fighter
Span 22⅛", length 19½". Redesigned. Long look flights. All silver. Kit SF-26, $2.65.

U.S. Army Boeing P-26
Span 20¾", length 17⅜". Very popular. Superdetailed. Yellow and olive drab. Kit SF-23, $2.50.

U.S. Army Hawk P6E Fighter
Span 23½", length 16⅝". Most authentic Hawk on the market. Yellow, olive drab, Selfridge Field markings. Kit SF-21, $2.25.

The World - Renowned Lockheed Vega
Span 20¾", length 20¾". Beautiful in looks—and flights. Brilliant red and cream. Kit SF-24, $2.75.

Long Flying Heath Parasol Sport
Span 23½", length 12⅝". Excellent for beginners. Steady flier. Orange and black. Kit SF-39, 98c.

'32 Air Race Winner — Gee-Bee Supersportster
Span 19½", length 13¾". Fast flights. A beauty in looks. White, red scalloping. Kit SF-27, $2.50.

Popular Monocoupe Sportplane
Span 24", length 15⅛". Has won many first prizes in contests. Cream and orange. Kit SF-29, $2.50.

U.S. Navy Boeing F4B3 (or 4)
Span 22½", length 15¾". Exciting to build—thrilling to fly. Silver, yellow, and red. Kit SF-25, $2.85.

Big Boeing 95 Mailplane
Span 33½", length 24¾". Easy for beginners. Good duration flights. Blue and silver. Kit SF-22, $2.50.

Comper Swift Lightplane
Span 18", length 13¾". Redesigned. Excellent flights. Green with black fuselage design. Kit SF-35, $1.25.

Sensational Lincoln Sport
Span 18", length 12¾". Beginner's model. Interesting flights. Cream, black trim. Kit SF-36, 98c.

Popular Waco C Cabinplane
Span 24¼", length 19⅛". Beautiful model. Good flyer. Silver and red. Kit SF-37, $3.25.

Aeronca C-3 Sportplane
Span 27", length 15¼". Keen flights and very easy for beginners. Red and silver. Kit SF-40, $2.65.

2-place Vought Corsair V-65
Span 24¾", length 19⅛". Super detailed. Beautiful flights. Blue, yellow, red, black, and silver. Kit SF-41, $3.75.

4-Wheeled Howard Racer "Pete"
Span 15¾", length 12⅞". Flies and climbs beautifully. Also data for "Mike." White, black details. Kit SF-42, 98c.

Douglas O-38 Observation
Span 30¼", length 22¾". Very beautiful, and unusually well detailed. Yellow, olive drab, black details. Kit SF-43, $3.75.

'30 Air Race Winner—Laird Solution
Span 15¾", length 13⅝". A fast flier. Pretty lines. Gold and black. Kit SF-46, $2.50.

'33 Air Race Winner — Wedell's W-Williams
Span 19⅛", length 16¾". Very beautiful in appearance and flights. Red, black and bronze. Kit SF-47, $2.95.

'34 Air Race Winner Turner's W-Williams
Span 19⅛", length 16⅝". Roscoe Turner's plane. Fast flying. Wedell-Williams gold. Kit SF-48, $2.95.

Dealers! Clubs!
See our message on back cover of this issue.

VERY IMPORTANT! READ BEFORE ORDERING

Try your dealer first. If he hasn't what you want, order direct, enclosing check or money order—cash at your own risk. No C.O.D.'s. On "Dwarfs"—add 10c extra per Kit for packing, if less than 6 are ordered. Please mention your dealer's name and address. Canada, Mexico, British Isles customers—add 10%; all other countries, 20% for foreign service charge.

Powerful Boeing 247 Transport
...n 55¼", length 38¾". A wizard for flights ...ll its two-motor pull. The thoroughly engi...ed drawing of four large panels (24") and supplementary sheet each ...ains accurate modeling information. ...16 oz. of liquids, ...cement, etc. En...ay gray in color.
Kit SF-35
$8.50

Send 5c Today
for complete C-D list of world's best Kits and full line of quality parts and supplies as illustrated here. Later, a Christmas list will also be sent you.

CLEVELAND
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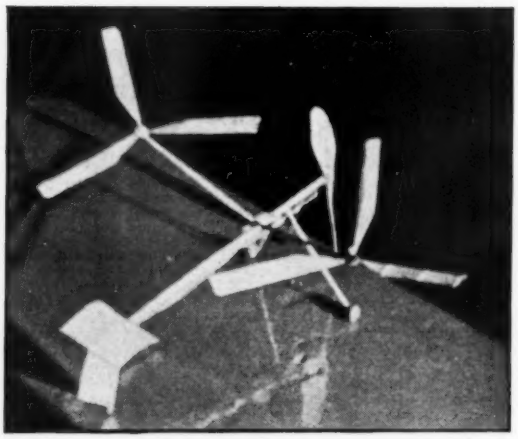
1866NL West 57th St., Cleveland, Ohio, U. S. A.

Building The Flying Twin Autogiro

At Last a Simply Made Autogiro That Will Afford You Many Thrills with Its Fine Performance

By E. CARLTON HARRIS



The little ship ready for a flight, and (below) climbing skyward

TO SOME, the art of building models is merely a rainy-day pastime. Those few, and I think they are few, have not the ambition to overcome the obstacles met by the fellow who recognizes model experimentation as a science; his model work as a series of tests and observations necessary for advancement and improvement in aerodynamic design.

It is builders of the latter type who will want to build this ship. The dual rotor arrangement involves the same principles as the common type, without complications needed on a model in place of centrifugal force on large ships. The average flight is over a minute. It resembles its larger brothers by an almost unbelievable 70-degree angle of climb and a vertical dead-stick landing from an altitude of more than fifty feet.

During the past two years of casual experimenting, in which six ships of successive improved design were built, a comparatively large amount of data was collected.

On the first ships, an elongated, diamond-shaped wing supported the rotors. During the period of evolution, the wing was uncovered from right to left in hopes of removing a condition brought about by torque. Finally, upon discovery of the fact that torque could be overcome by using less blade angle or negative incidence on the left rotor because it gave more lift to that side, the wing was substituted by a streamlined outrigger increasing duration 50 percent.

The last model of this type to be built was a cabin transport job which has a fine appearance. The model presented here was chosen because of its simplicity of construction and small bill of material.

The Rotors

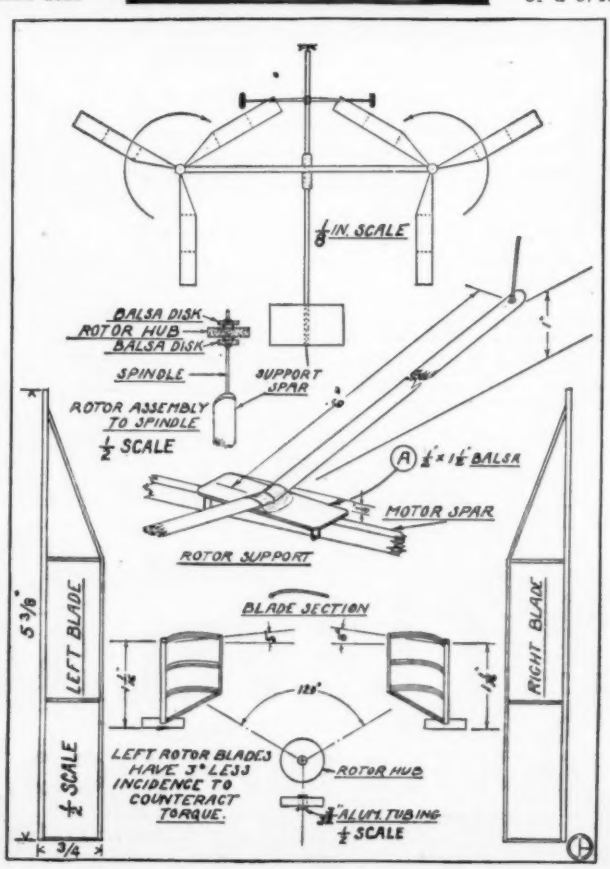
Undoubtedly the parts needing the greatest amount of accuracy and care are the rotors. Because of this they should be built first.

Three blades are needed for each rotor. Since the rotors turn in opposite directions it will be noted that the blades are different. They are built, one of each kind at a time, over the drawing.

While they are drying, the assembly jigs can be built. Each rotor is aligned on an eleven-inch circle drawn on a sheet of stiff paper which has three lines 120 degrees apart, extending from the center to the edge. At the outer end of the line with its smaller edge directly over the "A" a piece of ¾"x1-1/16" scrap balsa is glued with its top cut at the angle specified for that rotor.

The hubs are made next. They consist of a 3/16" length of 3/32"D., aluminum tubing, its surface roughened, then glued through the center of a ½" disc of ⅛" hard balsa. Trueness can be obtained by spinning the hub on a pin before the glue is thoroughly dry and correcting any wobbling noticed. When dry, the hub is pinned in the center of the jig.

Light tissue is used in covering the blades. The tapered ends of the blades are sharpened and inserted into pinholes around the hub. By twisting each blade until it rests squarely on the jig, the correct negative incidence is secured. Paint the hub and the joints with glue.



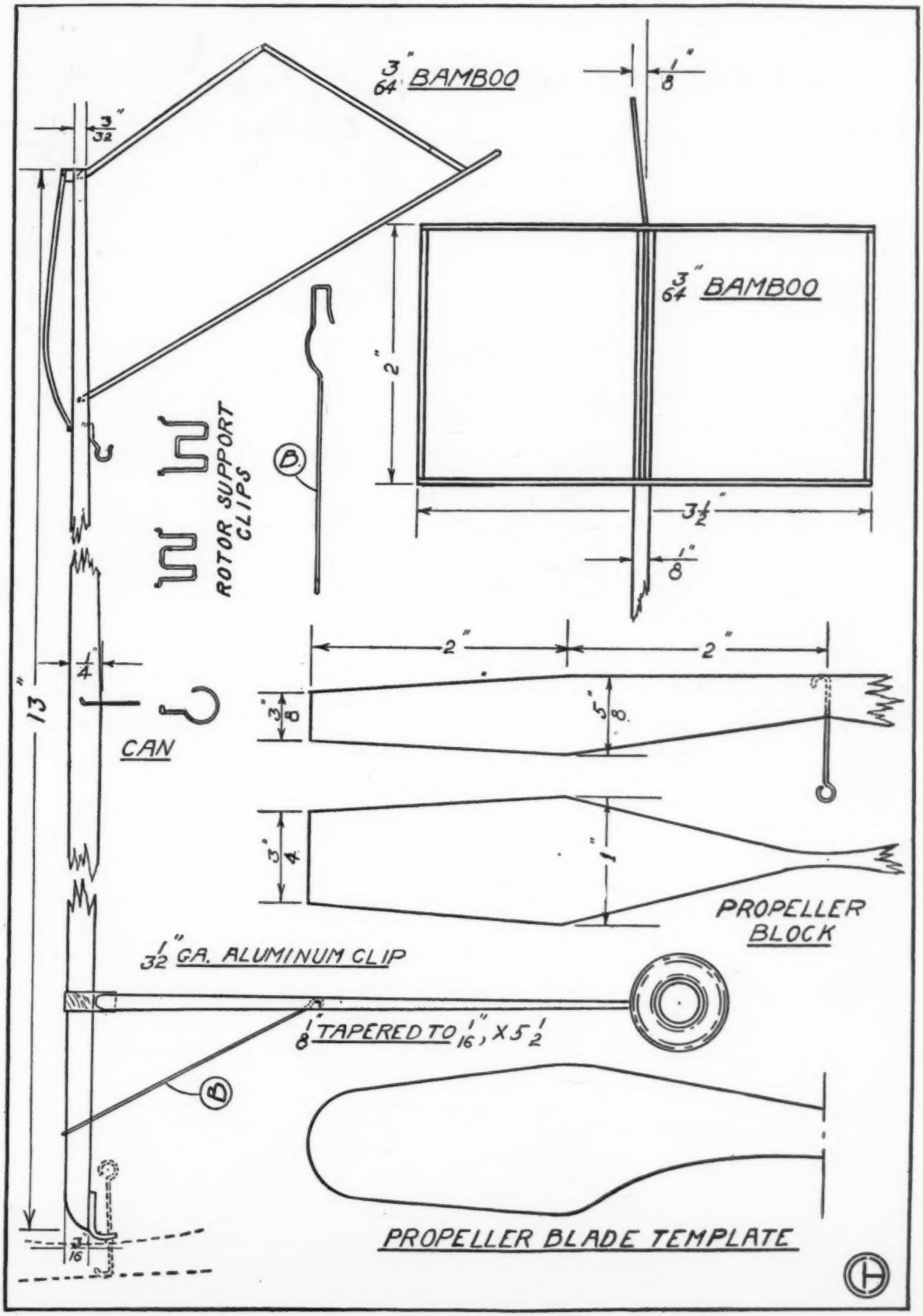
Rotor Support

The rotors are supported by a ⅛x¼ streamlined spar cracked in the center to a total 2" dihedral angle and glued firmly to piece "A," which is held to the motor spar by clips, bent as shown, of .015" piano wire. Vertical 1/32" round by 1" bamboo pieces at the ends of the spar hold the rotors at the top by small discs of balsa glued above and below each hub.

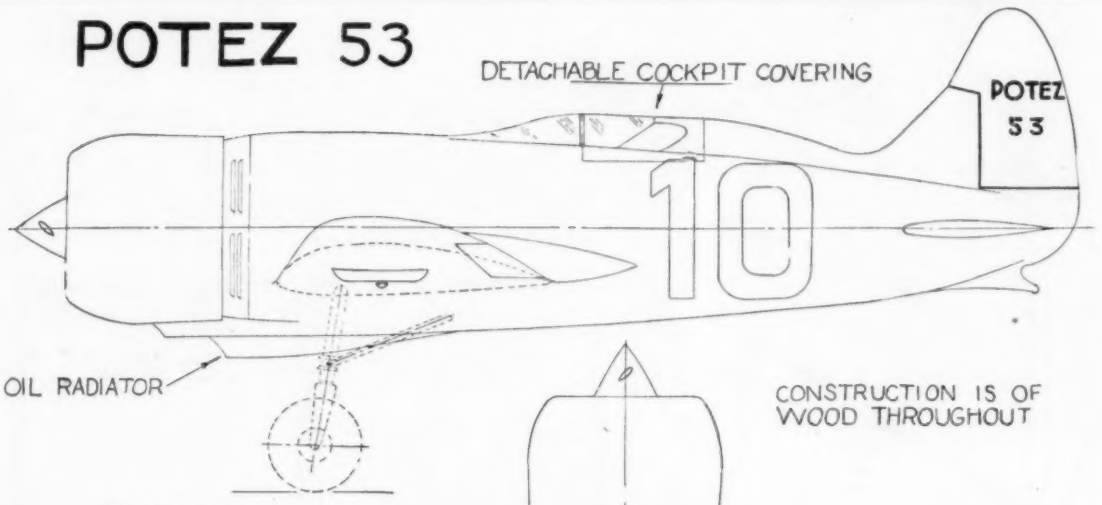
Motor Spar and Empennage

The 13"x⅛"x¼" medium balsa stick used for a motor base is tapered to the desig-

(Continued on page 46)

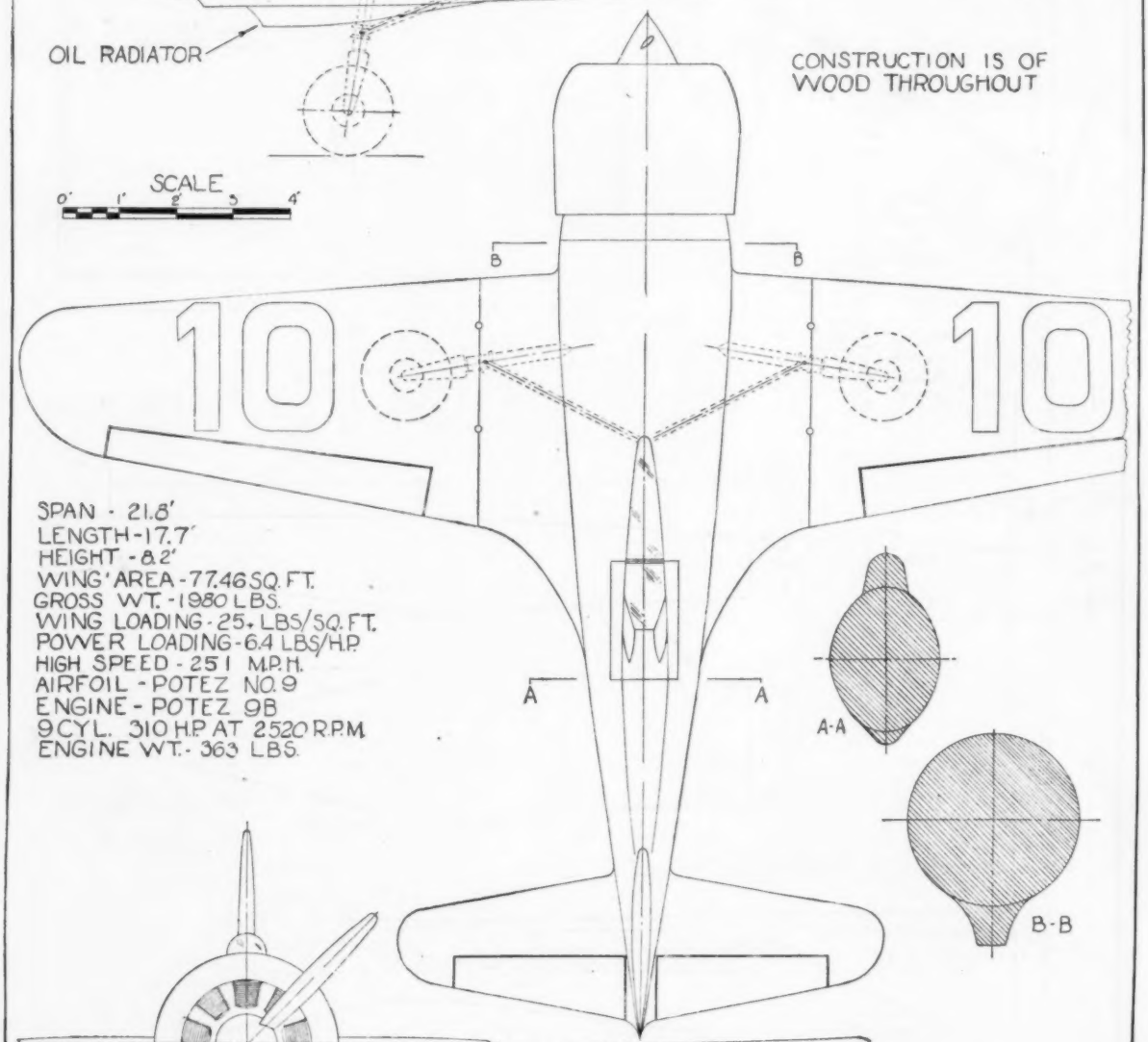

3/64" BAMBOO
1/8"
3/32"
3/64" BAMBOO
2"
ROTOR SUPPORT CLIPS
B
3 1/2"
1/8"
2"
2"
13"
1/4"
CAN
3/8"
5/8"
3/4"
1"
PROPELLER BLOCK
1/32" GA. ALUMINUM CLIP
1/8" TAPERED TO 1/16", X 5 1/2"
B
3/16"
PROPELLER BLADE TEMPLATE
H

POTEZ 53

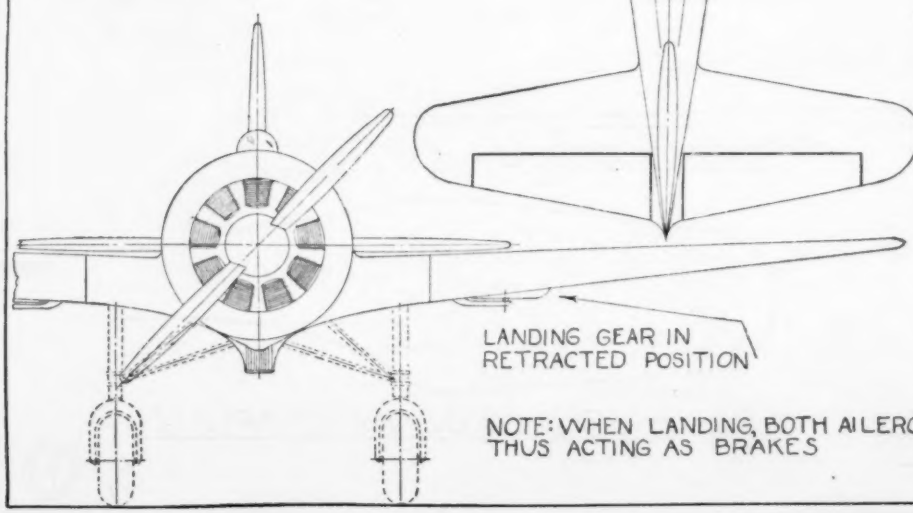


CONSTRUCTION IS OF WOOD THROUGHOUT

SCALE 0' 1' 2' 3' 4'



SPAN - 21.8'
LENGTH - 17.7'
HEIGHT - 8.2'
WING AREA - 77.46 SQ. FT.
GROSS WT. - 1980 LBS.
WING LOADING - 25+ LBS/SQ. FT.
POWER LOADING - 6.4 LBS/H.P.
HIGH SPEED - 251 M.P.H.
AIRFOIL - POTEZ NO. 9
ENGINE - POTEZ 9B
9 CYL. 310 H.P. AT 2520 R.P.M.
ENGINE WT. - 363 LBS.



LANDING GEAR IN RETRACTED POSITION

NOTE: WHEN LANDING, BOTH AILERONS ARE DEPRESSED THUS ACTING AS BRAKES

AJM

Airplane Observers' Contest Winners

Here Are the Winners of the Third Contest and the Winning Entry Submitted by Donald Chenoweth

No. 1	STINSON RELIANT SR-5A	No. 4	LAIRD LC-EW450
No. 2	STINSON SENIOR TRAINER "O"	No. 5	DOUGLAS XO-46
No. 3	NORTHROP "GAMMA" 2G	No. 6	CONSOLIDATED XBY-1
Name	Donald Chenoweth (First Name)	Address	214 No. 19th St. Richmond Ind.

The winning entry submitted by Donald Chenoweth

1st place winner, Donald Chenoweth

2nd place winner, William Haddock

THE Airplane Observers' Contest was organized by MODEL AIRPLANE NEWS to familiarize young men with various types and makes of airplanes through the research necessary in order to give the correct anwers. Besides this, it provided a lot of fun for thousands of airplane fans. Without question they know more about planes now than when the contest began. All of this adds to their aviation knowledge and to their future success in this profession; or, in fact, in any other one.

We regret that the announcement of the winners of the third contest has been delayed. However it was not deliberate, but due to not receiving confirmation of the correct names of the planes in the contest from the manufacturers in time to publish in the previous issue.

Whereas contest No. 1 and No. 2 required contestants to give the names and model numbers of only one and two planes respectively, the third contest required that they give the names of all the ships. This was quite difficult though not impossible, as the young men whose pictures appear on this page have demonstrated. They deserve much credit for their achievement. They not only named the planes correctly, but their entries were neater than any others submitted with correct names. As you know, *neatness* and simplicity had a great deal to do with the selection of the winners.

Several young men who entered the first and second contests have felt that their entries were misjudged when they did not receive a prize, though the correct names were given. In these cases they did not place chiefly because of lack of

(Continued on page 48)

3rd place winner, Irving Bailey

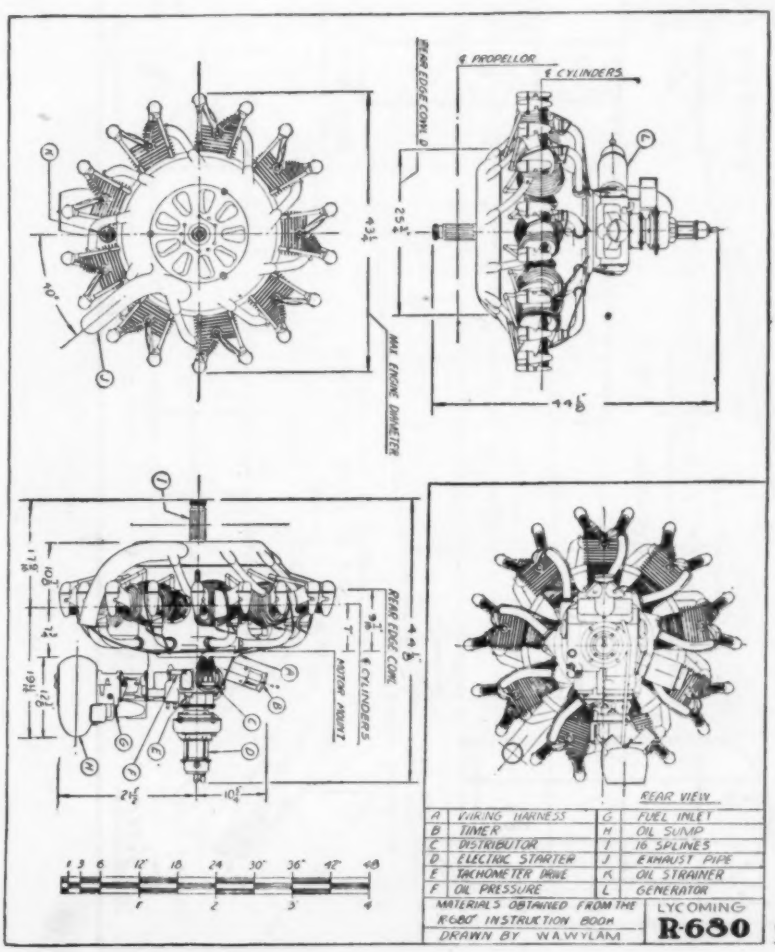
4th place winner, Stuart Collins

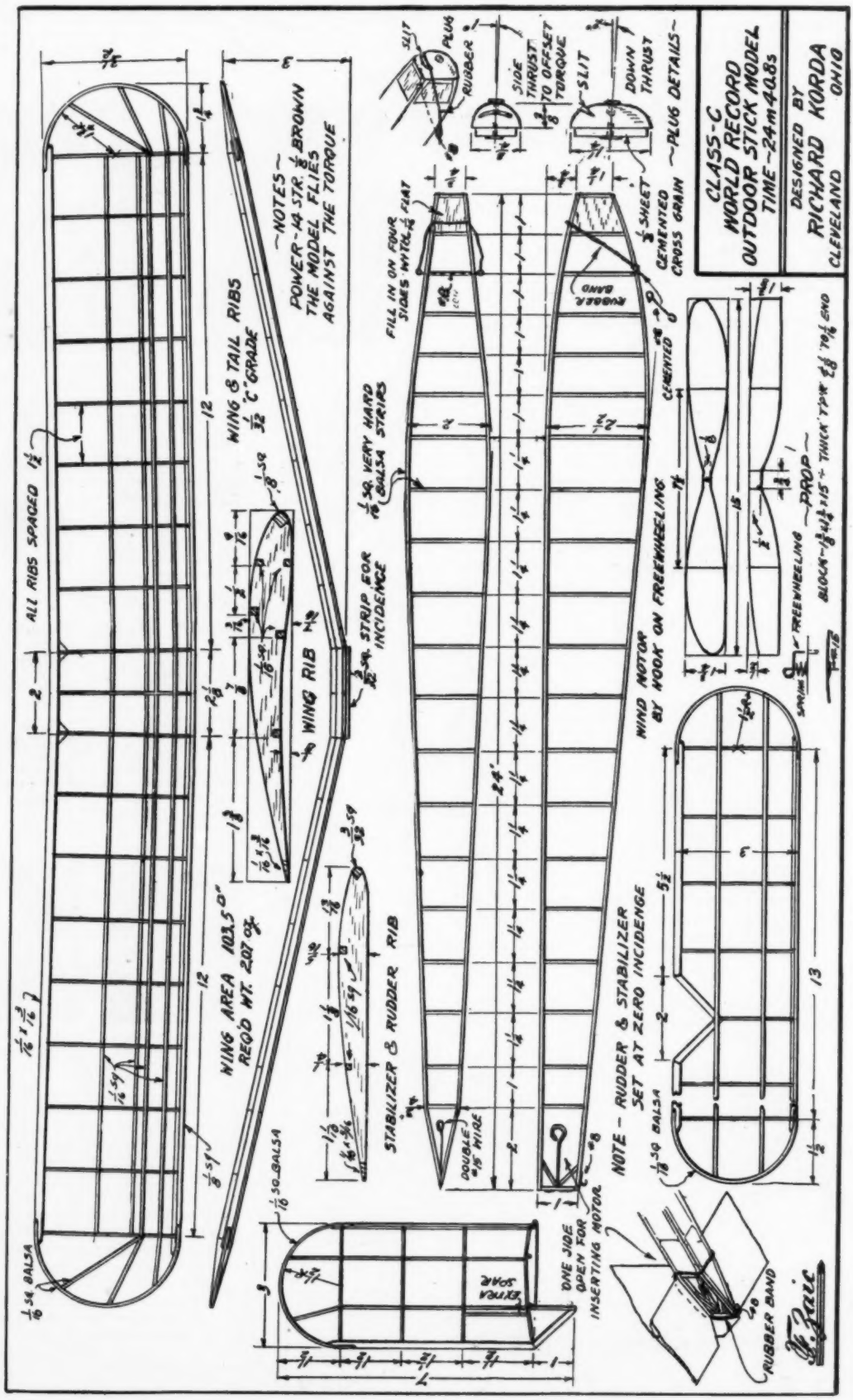
5th place winner, Robert S. Burke

8th place winner, Edward G. Ireland, Jr.

9th place winner, Edward Jarzombek

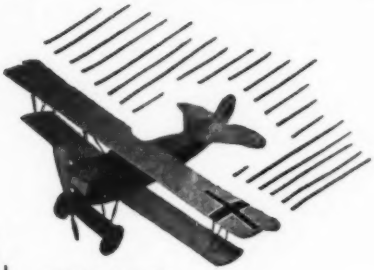
10th place winner, John Preis




CLASS-C
WORLD RECORD
OUTDOOR STICK MODEL
TIME-24m40.8s
DESIGNED BY
RICHARD KORDA
CLEVELAND OHIO
~NOTES~
POWER-44 STR. of BROWN
THE MODEL FLIES
AGAINST THE TORQUE
WING & TAIL RIBS
1/32 'C' GRADE
ALL RIBS SPACED 1½
WING AREA 103.5 sq in
REQ'D WT. 207 oz
WING RIB
STABILIZER & RUDDER RIB
1/16 SQ. STRIP FOR INCIDENCE
1/16 SQ. VERY HARD BALSA STRIPS
FILL IN FOUR SIDES WITH 1/4 FLAT
RUBBER BAND
CEMENTED
CROSS GRAIN
~PLUG DETAILS~
SLIT
PLUG
RUBBER
SIDE THRUST TO OFFSET TORQUE
SLIT
DOWN THRUST
1/32 SHEET
CEMENTED
WIND MOTOR BY HOOK ON FREEWHEELING
~PROP~
FREEWHEELING
BLOCK
DOUBLE #18 WIRE
NOTE - RUDDER & STABILIZER SET AT ZERO INCIDENCE
1/16 SQ. BALSA
1/16 SQ. BALSA
ONE SIDE OPEN FOR INSERTING MOTOR
EXTRA SOAK
RUBBER BAND

WORLD-WAR AIRCRAFT FLY AGAIN!

SPAD



FOKKER D VIII

NIEUPORT

S.E.5

MEGOW'S FAMOUS 30-INCH MODELS OF PLANES THAT FOUGHT ABOVE EUROPE

$1.00 COMPLETE KITS

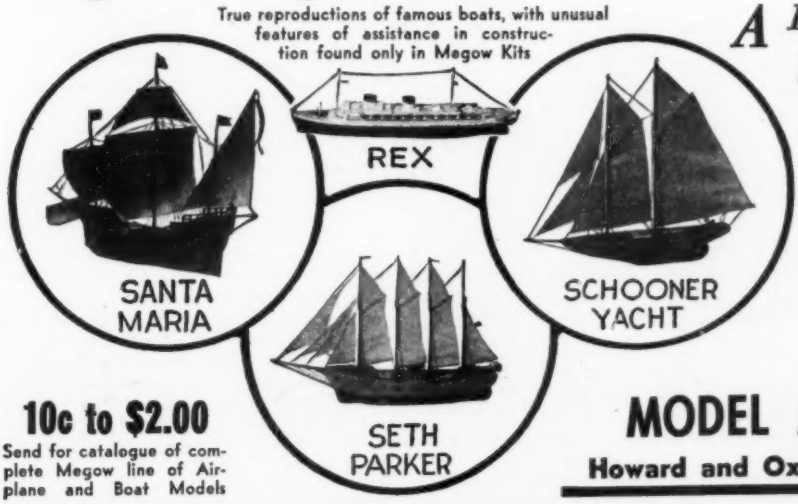
Thousands of young American "Aces" are building and flying these sturdy fighting planes. They are getting a new thrill out of model building—and getting splendid models, too, because the Megow Kit and plan of design is so complete and easy to follow. Picture your own Spad, S.E.5, Nieuport or Fokker DVIII taking the air, finely balanced, perfectly fitted, just as did the real planes during the war.

All the Megow skill and knowledge has been put into these 30-inch wing-span models to give you planes you will be proud to own.

Ask your Dealer for Megow Models. If there is no dealer near, add 10c for postage when ordering direct from the factory. (20c west of the Mississippi River.)

Megow's Ship Models

True reproductions of famous boats, with unusual features of assistance in construction found only in Megow Kits



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Send for catalogue of complete Megow line of Airplane and Boat Models

A Fleet of MEGOW MIDGETS *for* 50c

Boat Models, Flying or Solid Planes. Now you can have four 12-inch models all for one small price. Each model packed separately with complete details and plans of construction. Your Dealer can supply you with these new fleet combinations.

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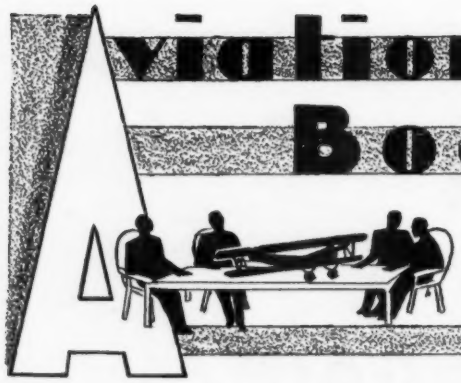
Howard and Oxford Sts. Phila., Pa.



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

ONE of the best ways that an aviation editor has of checking the interest in model airplane building, designing and flying, is by the number of questions asked concerning the subject. Inasmuch as the number of questions from our readers have been constantly increasing, it is only logical to assume that the interest in model planes is increasing proportionally. Of course, this means more model activity throughout the country; bigger meets and more meets, with a corresponding increase in the knowledge of aviation among young men.

Following are a few questions which may be helpful in increasing your knowledge of this interesting subject:

Question: In looking at some airplane advertisements I saw the expression "3/4" to the foot." How does this determine the wing span of a plane?

Answer: "3/4" to the foot" means that the model is built so that a measurement of three-fourths of an inch on the model represents a measurement of one foot on the regular airplane. If the full size airplane has a span of forty feet the model will have a span of thirty inches. In such cases in order to determine the size of the model, it is necessary to know the actual size of the full size ship. If the size of the model is given, you may then calculate the size of the full size ship from this scale.

Question: What do the initials S.P.A.D. stand for?

Answer: This question has been answered at least twice in previous issues.

Wayne W. Laird of Chinese Camp, California, is anxious to know how to obtain the correct angle of incidence when attaching a wing above the fuselage by struts.

Answer: The procedure depends entirely upon the type of struts to be used. The struts should be carefully laid out on the drawing so that the correct angle of incidence will be obtained. Remember, that a rise of 1/16" vertically in four inches horizontally will give one degree angle between the sloping hypotenuse and the horizontal. One-eighth inch will give two degrees. The best way is to work out, to the closest possible degree, the correct length of the struts, attach the struts to the wing and the wing to the fuselage. When assembling the wing to the fuselage, adjust the wing assembly so that the wing chord is at the proper angle with the line of thrust the line of thrust being the center line of the propeller shaft.

In actually doing this, it is best to continue the center line of the propeller shaft rearward, drawing a pencil line along the side of the fuselage to indicate its location. To give a one degree angle to the wing, if the wing chord is four inches, make the distance from this line to the leading edge 1/16" greater than the distance from this line to the trailing edge. If the wing chord is three inches, the one degree incidence will be given by ¾ of 1/16; or 3/64. In average cases the wing is given an incidence of two degrees.

It seems that Mr. Laird has had difficulty obtaining successful flights from his models due to improper adjustments. He has done everything possible to correct this. From the information given in his letter it is impossible to tell what is the matter, so we will outline briefly the relative set-up of wing, tail and center of gravity that will give good results. If you incorporate this combination accurately in your model, you will have no difficulty.

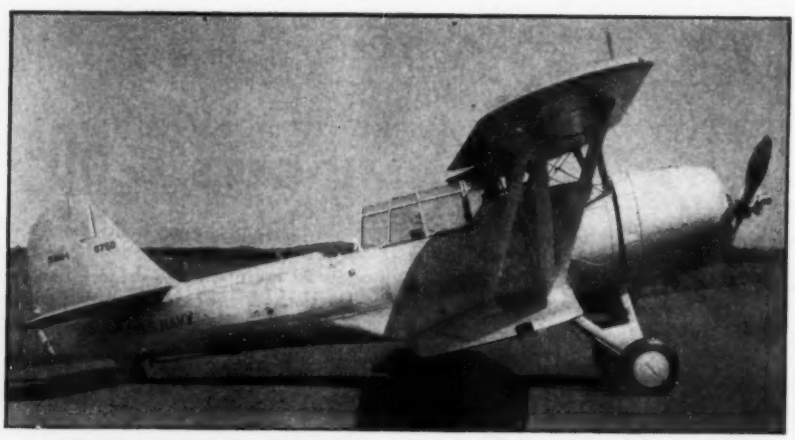
First, set the wing at two degrees with the line of thrust in mid-wing airplanes, in high-wing airplanes at one degree. Set the stabilizer at zero degrees incidence with the line of thrust, or parallel to it. The center of gravity relative to the wing should be back of the leading edge one-third of its chord length. It may be below the wing itself. This makes no difference, rather it would be helpful.

We suggest that you balance the model minus the wing and determine the balancing point accurately. Mark it on the side of the fuselage, measure forward from this point a distance equal to one-third of the wing chord, provided the wing is a straight edge wing with no sweepback, and put a mark at this point. The leading edge of the wing should be directly over this mark. In conjunction with this, the area of the stabilizer should be approximately thirty per cent of the total wing area, in monoplanes. In biplanes, however, it may be twenty to twenty-five per cent.

Here we have a question from Robert H. Uber of 3823 North Maryland Avenue, Milwaukee, Wisconsin, which we believe may be useful to many who have not entered contests and wish to break into this field.

Question: How does one go about winding a rubber motor with a winder?

Answer: The first step is to get another person to hold the model while you wind the rubber. Second, the rear end of the motor should pass through an S hook which in turn hooks over the rear motor hook when the motor is in place. Detach this S hook from the rear motor hook and hook it through the loop or hook of the winder, being sure that when you wind that the motor winds up to the right as you face its rear end. Stretch the motor out to twice or two and a half times its length and wind until the motor is approximately two-thirds wound. Then gradually shorten its length by moving toward the airplane, winding continuously so that when the motor is fully wound it is equal to its normal length again.



The first new scout-bomber, Vought SBU-1, eighty-four of which are being constructed for the U. S. Navy. This new type is expected to show higher performance characteristics than have been achieved by other service planes of this class. It will be used for bombing and long range scouting, for which two distinct types of planes have been required previously

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FAMOUS SUPER-DETAIL MODEL SHIPS!

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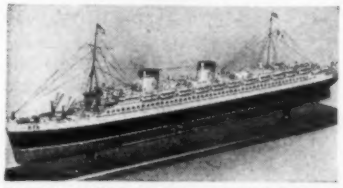

29"—scale 1/32" to the foot. Patented Hull Design Shaped hull and over 100 metal fittings, 24 cast metal lifeboats; 24 cast stairways; 2 cast anchors; 4 metal propellers; 6 cast bits; 48 metal davits. The Rex comes in beautiful high luster original colors of black, orange, white, red and green; and the kit also contains turned wood parts, printed wood, cement, wood filler, sandpaper, etc. **postpaid**..... **$6.00**

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Full size plan—scale 1/32"—sheet 34" x 44"—full instructions—7 photos—25 detail views. Everything included complete, **only 25c postpaid.** Regular value $1.00.

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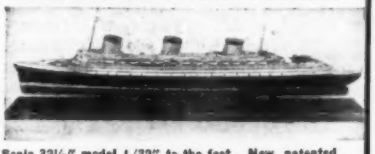
The newest, fastest ship afloat. Beautiful new French liner.



Scale 32½" model 1/32" to the foot. New, patented hull design.

Here is a dream of a boat model that you will want to build. Normandie has a shaped hull and over 100 metal fittings—over 1000 portholes—60 metal davits—30 life boats—16 winches—24 cast metal stairways. Comes complete with all the beautiful, original high luster colors, cement, full size plan, turned wood parts, printed wood—printed fiber patterns, and everything complete that is necessary to build this model.
Postpaid..... **$7.00**

NORMANDIE PLAN

Full size plan—scale 1/32"—sheet 34" x 44"—full instruction—7 photos—25 detail views. Everything included complete, **only 25c postpaid.** Regular value $1.

NEW IDEAL TRU-CUT NIFE

The IDEAL knife for building models—Tru-Cut Nife. Send for this new, keen, patented, razor-edged knife. Securely fastened to a long holder it can follow intricate curves; cuts balsa like butter! Excellent for every cutting purpose. **15c postpaid. Extra blades 3 for 10c.**

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We have learned a lot in this quarter of a century. And all of this experience goes into the building of the present accurate guaranteed super-detail model planes and boats.

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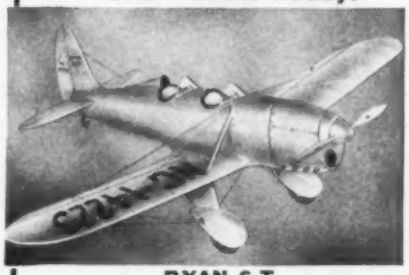

RYAN S T

Wingspan 22½", length 16½", weight 2½ oz., scale ¾". New fast Ryan has dual control system which operates in either cockpit; adjustable wing flaps; plans for making an actual working engine—4 cylinders with movable pistons, carburetor and spark plugs.
Complete kit..... **$1.50**

BOEING P-26A

Wingspan 21¼", length 18", weight 2½ oz. Exact ¾" scale. This flying model is an exact replica of the famous fighter—one that is identical in all but size with its noteworthy big brother. Beautifully colored in olive drab and yellow. All Super-Detail parts included. Kit complete, postpaid..... **$1.75**

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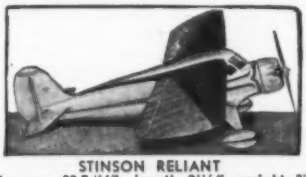
Wingspan 23⅜", length 16¾", weight 3½ oz., exact ¾" scale. Coated with new IDEAL high lustre finish, with silver, yellow, red and black coloring. Kit complete, postpaid..... **$2.00**



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Wingspan 32 5/16", length 21¼", weight 3½ oz., exact ¾" scale. Adjustable speed arresters built into the wings, movable cabin doors, complete interior with four seats and control column, and all the other Super-Detail features. Colored in bright contrasting yellow and black. Kit complete, postpaid..... **$2.50**

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Wingspan 35", length 22½", weight 4⅛ oz. Exact scale. Retractable landing gear, rotating gun turret, movable machine guns, special streamline cowlings, two types of 3 bladed propellers—one for flying and one for exhibition with removable motor sticks for flying; rudder and elevator balanced surfaces; new type freese ailerons. Kit complete, postpaid..... **$3.50**

Here's a bargain!

FREE Get $.50 worth of supplies absolutely free by sending us an order for $1.00 worth of supplies (kits not included). Get this free.

1 6" balsa propeller	$ .06
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3/32x3/32.. 5 for	.05
1/8x1/8.. 5 for	.05
1/8x3/16.. 3 for	.05
1/8x1/4.. 3 for	.05
1/8x3/8	.03
1/8x1/2	.04
3/16x3/16.. 2 for	.05
3/16x1/4.. 2 for	.05
3/16x3/8	.04
1/4x1/4	.03
1/4x1/2	.04
1/4x3/8	.05
3/8x1/2	.07
3/8x1	.09
1/2x1/2	.08
1/2x1	.12
1x1	.17

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1/32x2	.05
1/32x3	.06
1/16x2	.06
1/16x3	.09
3/32x2	.07
3/32x3	.11
1/8x2	.07
1/8x3	.10
3/16x2	.09
3/16x3	.13
1/4x2	.11
1/4x3	.15
3/8x2	.13
1/2x2	.17
1/2x3	.22

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3/8x1/2x5	.01
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5/8x1x9	.04
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Special Blocks For Cowlings, Nose Pieces, Wheels, etc.

2x2x2	.06
1x3x3	.10
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Model Builders Knife, each .10

Japanese Extra Super-Fine Silk Tissue
Sheet 18"x24" .10

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For models that are to be covered with colored dope. Sheet 29"x25", 2 for .05

Clear Dope; Colored Dope; Acetone; Banana Oil

1-oz. bottle	.10
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1" diam., pr. .10
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1" diam., pr. .15
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SPECIAL
For a short time only our regular 10c size INSIGNIA SHEET printed in two colors on gummed paper, only **5c**

Scientific Expert Rubber
1/16" sq., 3 ft. for .01
skein .05
1-16" sq., 3 ft. for .01
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Skeins consist of 225 ft.

NEW ARMY and NAVY Insignia Sheet
Size 12"x19" each
10c

Miniature Machine Gun

3/4", each	.05
1 1/4", each	.06
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Rustproof Music Wire

.010" diam...2 ft.	.01
.014" diam...2 ft.	.01
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Camel Hair Brushes, each 5c

Bushings

Per doz.	.04
Per gross	.40
Large size bushings	
Per doz.	.05
Per gross	.50

Thrust Bearings

Small size—.028" hole	
Each	.02
Per doz.	.20
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Each	.02
Per doz.	.20

Winders
Strong and durable. Can be used on either indoor or outdoor models. .30

Model Making Pins
1" length, T pins packet of 50 .10
1/2", 100 .10

Brass Washers

Per doz.	.02
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Per thousand	1.25

Aluminum Tubing

1/16" O.D...per ft.	.10
3/32" O.D...per ft.	.10
1/8" O.D., per ft.	.10
5/16" O.D...per ft.	.15
1/4" O.D., per ft.	.15

Sheet Aluminum

.001", per sq. ft.	.15		
.002", per sq. ft.	.15		
.003", per sq. ft.	.15		
.005", per sq. ft.	.20		
.010", per sq. ft.	.30		

Ready-Made Balsa Propellers
True-pitch, with drilled center for shaft

6"	.05	10"	.12
7"	.06	11"	.15
8"	.07	12"	.20
9"	.09	13"	.40
9"	.10		

Propeller Shafts

1 1/4" long..4 for	.05
2 1/2" long..3 for	.05
3" long.....2 for	.05

Wood Nose Plugs
Nose plug for models with 12" to 36" wingspan. Special low price, each .01

IMPORTANT: Add 15c for packing and postage on all supply orders.

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In England: H. & S. Norman, 46 Derby Rd., Kirkhams, Prestwich, Lancs.

Unhook the motor from the winder and hook it in place in the airplane. The machine is now ready to fly.

Question: What was the best French bomber of 1916?

Answer: Probably the Farman Bomber was the best during this period.

Airways—Here and There

(Continued from page 21)

Hempstoch's address is 18 Newton Ave., Hamilton, Ont. Picture No. 7 shows a group of the club members with a few of their models. The impression one gets is that they are all serious young men who are not merely playing with an idea, but are using model airplanes as a means of instruction to prepare them for a future career in aviation. The club is under the direction of Mr. George Walker, who is not in the photo. The senior club members give lectures at the various meetings, different topics being discussed. Questions and discussions take place after each lecture. Hempstoch says, "In this way we learn a great deal about aviation theory. The club is divided into flights of five members, each headed by a flight leader. Our President, Fred Ward, is Squadron Leader."

News just comes from Canada that a new world's record was set by a semi-scale model built by Albert Levy of Toronto. It floated through the air for two minutes, fifty-nine seconds and won first prize in this event in the contest. New Canadian records were set by fourteen-year-old Clarence Dunn of Hamilton, whose plane in the indoor stick junior class, remained in the air four minutes, fifty-nine seconds; and Harold Frier of Birch Cliff, whose semi-scale model in the senior class remained aloft two minutes, nineteen seconds. These flights were staged at the Canadian Championships in the Coliseum at the C. N. E. on September 4th.

France

At the Coupes de France, which was recently held, the Model Air Club of France was well represented. Mr. Dubois, a member of the club, placed first in two events. The members of the club showed great activity and took a large number of the prizes. The others who took first places were Mr. Lorzit and Mr. Vincre. One of the interesting exhibition models was built and flown by Mr. Vincre. It was a model of the "Pou du Ciel," or in English, the "Flying Flea," shown in picture No. 8. The original full-scale ship has been causing a great sensation in Europe. It is exceedingly small, has no tail surfaces, but instead has one large lifting wing at the rear and below the main wing surface. It flies with a motor of very few horsepower. The model in the picture is in full flight and is an excellent demonstration of its flying ability.

Japan

Picture No. 9 shows Mr. Hiroyasu Minowa of No. 3 Wakamatsucho, Ushigome-ku, Tokyo, Japan, holding a flying scale model of the Japanese Fighter No. 91. The ship has a span of about thirty inches. It is beautifully made, as you can see. Mr. Minowa is an extreme model enthusiast and is leader of a large group of young model builders. He directs their activities and promotes their knowledge of aviation through model flying.

CLUB NEWS

Indianapolis, Ind.

Sixty boys from six Middle Western states participated in the third Annual American Legion Model Airplane Contest held in Indianapolis, Ind., on August 24th and 25th. A total of 156 models were entered in all the events. Most of the championship honors were won by Indianapolis builders. Young men from Chicago, St. Louis, and Detroit, who won the meets in previous years, defended themselves in vain.

Vernon Boehle, of Indianapolis, was the high point winner with 14½ points. He was declared national all-round champion model airplane designer. He made his points by winning the outdoor event for model planes with internal combustion motors with a flight of five minutes, nineteen seconds, the outdoor fuselage event; and by placing third in the indoor fuselage and indoor experimental events. Jim Cahill, of Indianapolis, was runner-up to Boehle with a score of twelve points. The outdoor fuselage event was one of the most popular with the contestants; fifty-two models were entered. The outdoor speed event was next in popularity with thirty entries. The indoor events were held on the opening day in the large Butler University Fieldhouse. The outdoor events were staged at the Municipal Airport, six miles from the city. The best time of the meet was made by Vernon Boehle's outdoor fuselage model, which stayed aloft twenty-seven minutes, six seconds. Mr. H. Weir Cook was director of the contest.

Picture No. 10 shows a group of the gas model contestants and their "brain children." Picture No. 11 shows Lawrence Harlow with his model helicopter, which won the experimental events.

MODEL AIRPLANE NEWS wishes to commend the directors of this contest for instituting an event of this character, inasmuch as it promotes original ideas and research in aviation. This is invaluable to its future in this country.

Lakehurst, New Jersey

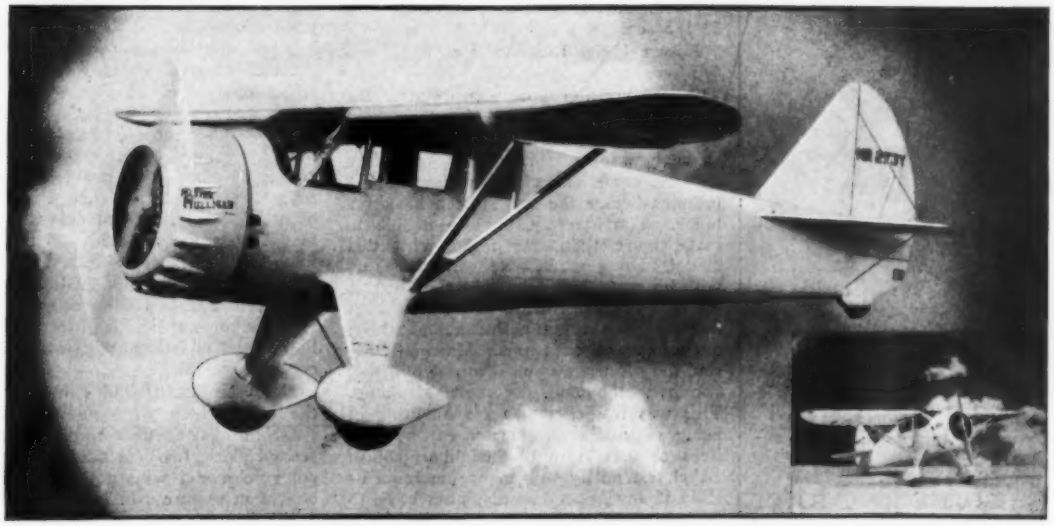
The Junior Birdmen of America held their first all-gas model contest at Lakehurst, N.J., on August 28th. There were in the neighborhood of fifty contestants in the contest. Every one of them brought one or more gas models. The contest was held in the big dirigible airport just north of the dirigible dock which formerly housed the Akron. The first part of the day was cloudy, but finally about 3:30 p.m. the sun broke through and several models went up for their flights. The contest was won by Maxwell Bassett with a time of seventeen minutes, forty-eight seconds. The first five winners were:

Maxwell Bassett, Philadelphia, Pa., 17 min. 48 sec.

Leo Vartanian, Brooklyn, N.Y., 17 min. 28 2/5 sec.

A PEERLESS 3/8" SCALE MODEL

Span 24"



Length 18¾"

AN EXCLUSIVE PEERLESS PRESENTATION

BEN HOWARD'S "MISTER" MULLIGAN

THE ONLY AIRPLANE TO EVER WIN BOTH THE BENDIX AND THOMPSON TROPHY RACES IN THE SAME YEAR

Fast Time in Bendix Race

8 hours 33 minutes 16.3 seconds after he left Los Angeles Ben Howard set his speedy "Mister" Mulligan down at the Cleveland Airport—Winner of the 1935 Transcontinental Bendix Race and the most thrilling of all the Bendix Races. His average speed for the 2042 miles was 238.704 M.P.H. It was a race of great excitement and danger. Cecil Allen in his Gee Bee crashed and was killed a few miles from the start. Head winds battled them most of the way and forced a landing at Kansas City for refueling. Flying at 20,000 feet the cold was severe and crept in thru the pyrolin windows. And then the storm and rain over Ohio made the finish in Cleveland the most dangerous part of the whole race. But Ben Howard was at the controls and "Mister" Mulligan performed gloriously like a true winner and champion.

Takes Thompson Race Under Wraps

To make the 1935 Air Races a complete 100% triumph for "Mister" Mulligan Harold Neumann flying the white wonder ship for Ben Howard took first place in the Thompson Trophy Race without even opening the throttle up to full speed. Neumann didn't want to injure the Special Wasp engine with which "Mister" Mulligan is powered so he flew the race with the motor at three quarter speed and WON. The crowd of 85,000 gave him a tremendous ovation and "Mister" Mulligan became the most talked about plane of the year.

COMPLETE PEERLESS KIT: A beautiful flying model of this beautiful plane. Colored white and black with gold and silver trim. Kit contains all materials, printed wood, illustrated plans, the famous Peerless Fuselage Jig for building perfect fuselage. Plan shows full details for cockpit, seats, instruments, etc. There is nothing else to buy..... **$3.00**

(15% extra West of Denver)

The Peerless Model Kit of "Mister" Mulligan is the only Kit authorized by Ben O. Howard. All other model kits are mere copies of our well known design.

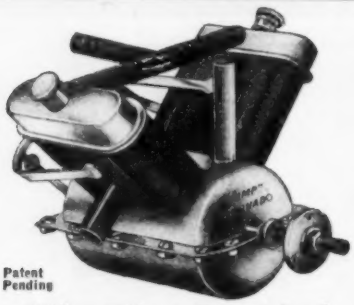
DEALERS: Write for details. With our publicity you can sell many "Mister" Mulligan Kits and the complete Peerless Line.

COMPLETE CATALOG Send 3c stamp for a complete catalog of Peerless Precision Kits and Supplies that Master Builders choose.

THE PEERLESS MODEL AIRPLANE CO.

15531 Madison Ave., Lakewood, Ohio

Ohio residents add 9c Tax.



Patent Pending

The First Practical
Low Priced
Power Plant
for Model Airplanes!

Put pep and go into your Models with a real power unit that will give you big plane performance. Do it with an

"IMP" Tornado Motor

You can build it into the nose of any type model, the one you have now or a new one; entirely out of sight. It will swing large propellers at high speed for long flights. Easy starting, no stalling, costs hardly anything to operate. Runs on AC-CO Gas, generated in the "IMP" Generator; a new invention that will revolutionize model flying. Will also run on compressed air.

Model V-4 (shown above) four cylinder. Weight only 3½ oz. Will fly models from 4 to 8 feet. Complete with Generator, Feed Line and Safety Clip..... **$7.50**

Model S-2, two cylinder. Weighs 2½ oz. Flies models 3 to 6 feet. Complete with Generator, Feed Line and Safety Clip..... **$5.00**

(If ordered by mail; add 25c for postage)

Send for FREE Circular right now and find out about these Motors.

Use the Genuine

PAULOWNIA

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WOOD PROPELLERS

"As Light as Balsa with Twice the Strength"

Accurately carved and beautifully finished by hand, guaranteed true balance, with hole drilled for prop shaft. The perfect prop for efficiency on flying models and realistic appearance on exhibition models.

None Genuine Without this Label

All Prices Greatly Reduced!

Size	Standard Type	Helical Navy Type	Steel Type
5 in. each	10c	10c	15c
6 " "	12c	12c	20c
7 " "	15c	15c	25c
8 " "	18c	18c	30c
9 " "	20c	20c	35c
10 " "	22c	22c	40c
11 " "	30c	30c	45c
12 " "	35c	35c	55c
13 " "	45c	45c	60c
14 " "	55c	55c	70c
15 " "	65c	65c	80c
16 " "	80c		1.00
18 " "	1.00		1.15
20 " "	1.25		1.35

Prices Include Postage

Free with your order for Propellers; a real gift that saves you money:

with 50c order—One No. 1 Propeller Shaft
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Distributed on Pacific Coast by Lawrence W. Brown Aircraft Company, Model Plane Div., Willowbrook, Calif.

Henry Stadelmeir, New York City, 17 min. 24 2/5 sec.

Joseph Kovel, Brooklyn, N.Y., 14 min. 23 1/5 sec.

Robert Long, Reading, Pa., 11 min. 8 4/5 sec.

The winning flights were made after the clouds had dispersed. Joe Kovel, as usual experienced a little hard luck, inasmuch as he flew his world's record job before the sun came out and lost it until five minutes before the bus started back for home. Consequently, he was unable to make more than one flight with this model. However, he made several flights with his eight-foot job. The time of this job was not long, being in the neighborhood of seven minutes, the motor cutting out on several occasions. Maxwell Bassett, the winner, was unfortunate in losing two perfectly good gas model airplanes. This was tragic, not to say anything of being expensive. Will not anyone who lives or travels in the neighborhood of Lakehurst notify this magazine immediately if any gas model airplanes have, to their knowledge, been found? By doing this you will be rendering a real service to these serious-minded aviation enthusiasts. One young man lost a model out of the back of the truck between Lakehurst and New York. Have any of our readers heard of such a model being found? The model was not set up, the wings and tail surfaces being demounted from the fuselage.

Mr. Lawrence Shaw, head of the Junior Birdmen, and Mr. Irwin Polk prepared and directed the contest, with the help of the U.S. Navy officers and enlisted men who are stationed at the Naval Dirigible Dock. The contest ran very smoothly. Many model builders expressed their liking for the system by means of which they could have as many flights as they chose, the number of official flights not being limited to three flights. Contestants came from every part of the East and various interesting types of gas jobs were presented.

From Baltimore came a group of young fellows with some exceedingly original models. In this group there was one biplane, one low wing, one scale Fairchild "24" and two parasol models of the Fairchild "22" type. Mr. Andrew Boryske of 1485 East 96th St., Brooklyn, N.Y., collected considerable information for MODEL AIRPLANE NEWS. He tells it as follows:

"The biplane mentioned above was built by Robert S. Watson of 2801 Westfield Ave., Baltimore, Md. This model which is in picture No. 12 had remarkable strength, yet was light and a swell flyer.

Another interesting model was the pusher built by the Noble brothers of Middlebury, Conn. These boys had previously built a Monocoupe which they had present at the Eastern States Meet. The most conspicuous thing about this model was the wing area. The wing spread was 12 feet. The wing was tapered with the chord at the center section being 23 inches; total area being 18 square feet. The wing was built in three sections, the outer sections being joined to the center section by means of dowels passing through screw eyes. The model was covered with nainsook. Tail surfaces were supported on two balsa booms, the whole outrigger system being braced with piano wire.

There were five gas jobs present from Atlantic City. Two of these were very small models of 58-inch span, 10-inch chord and a fuselage length of 38 inches. They weighed approximately three and one-half pounds, were covered with bamboo paper and had a novel landing gear design. Their designer is Alfred Rubin of Atlantic City. The models were tricky to get into the air and when in flight flew fast and appeared to be unstable.

One of the best-finished models belonged to Frank Ehling of Jersey City. He attributes the high gloss to the one-half pound of enamel with which he covered the model.

Maxwell Bassett had two gas jobs at the meet which were not blessed with good looks, but flew well. Winner of second place, Leo Vartanian, had a parasol type model with a polyhedral wing, shown in picture No. 14. This model is a consistent winner and since not much is known amongst gas job builders of its construction, I'll tell you a little about it. There is nothing unusual about its construction. Incidentally, it is very similar to Joe Kovel's job. The fuselage is built up of ¼ squares with plenty of diagonal bracing. A hard grade of balsa is used throughout with occasional pieces of spruce thrown in.

Henry Stadelmier, who was a close third, had a very fine model. The angles of fuselage members were cut very accurately. Trailing edges were sanded to razor blade thinness. Fuselage was of ¼ squares covered with bamboo paper. In the rear of the fuselage was a pendulum device for keeping the model in the proper attitude when in flight. Landing gear was of hard wire with laminated balsa wheels.

This meet was very important in that there was little soaring possible. Terrain not so hot,—too many flat forests close by.

Newark, New Jersey

The Bamberger Aero Club has had a new offspring in the form of "Tailspins," a newly organized official club paper. The Editor-in-Chief is Phil Zecchetella who is well known in model aviation and numerous circles. Under his guidance and with the help of Nathan Polk, Director of the club, this little weekly is proving to be extremely interesting. We wish them the best of luck.

The club has been extremely jubilant over the fact that one of its members, Leo Weiss, captured the Texaco Trophy at the St. Louis National Contest for duration in the gas model airplane event. At present the club is distinguished for the fact that two of its members are the only ones who have made official flights of over sixty minutes. Leo Weiss' flight time is sixty-four minutes, twelve seconds. Joe Kovel, another member of the club, now holds the world's record for limited fuel supply at sixty-four minutes, forty seconds. Both of these flights were of longer duration than the time would indicate, as the models flew out of sight.

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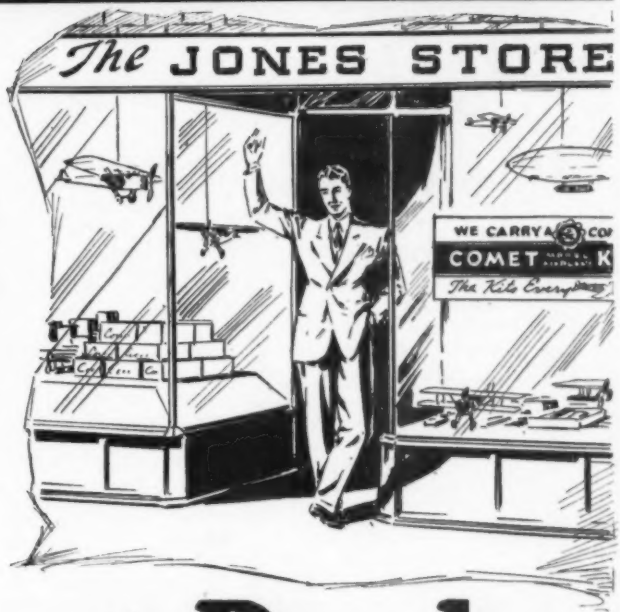

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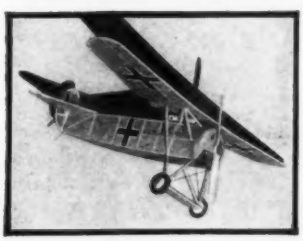

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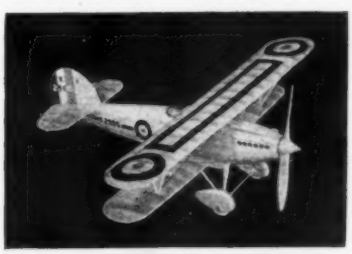

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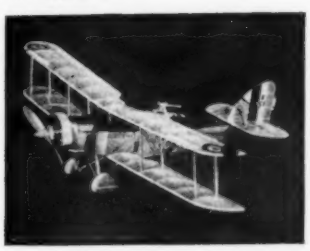

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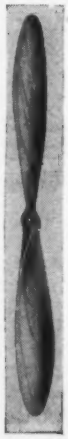

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Long Island, New York

We are pleased to learn that Lt. John L. Sherer has organized a large model airplane club out in Long Island under the name of the Long Island Model Club. The club intends to hold inter-town contests and to conduct an annual contest to determine the Champions of Long Island. Those interested in joining this newly formed club, write to Lt. Sherer at 114 West 16th Street, New York City.

Mr. Malcolm Bell of 106 Groton Avenue, Cortland, New York, has an unusual idea which we feel is well worth recording. He wishes to form a model airplane club that is wholly correspondent. He says,

"Our object is to bring together ideas in model building of all kinds by means of correspondence. We plan to give awards for club records set by members and also a cup to the outstanding member. To join one must send his photograph, ten cents to defray the costs of awards and a description of what he is interested in. For further information write to the above address."

Portland, Oregon

Mr. Henry S. Camp is Secretary of the Icarian Club of Grant High School of 3262 N. E. Dunckley Avenue, Portland, Oregon. He wishes to draw to our attention the fact that there is an active club in this city. Members will welcome letters from members of other clubs who wish to write to them. The club is planning to build a "hedge hopper" or small airplane under the able supervision of Mr. William T. Eilertsen, Mechanical Drawing instructor at the High School. The club has been started not only to build models but to carry on the study of aeronautical engineering as a preparation for aviation careers. The officers of the club are:

President—Bob McGill, Vice-President—Clifford Hacheney; Secretary—Henry Camp. Bob has a Student Pilot's license; Clifford is the city champion of model makers, and Henry is one of the owners of a prosperous model airplane company. It seems that this club has all the elements of success.

Von Richthofen Aero Club

The Von Richthofen Aero Club of 461 Dean St., Brooklyn, N.Y., is a very progressive model club. It has been established for over three years. Following are its members:

J. Erickson, A. Erickson, S. Engelbrektson, E. Webster, G. Webster and R. Erickson. J. Erickson is the Commander and A. Erickson the Adjutant. This club gives instructions to the younger fellows, which is very commendable. More news will be given later of this club.

Birmingham, Alabama

Through the courtesy of William B. Huie, Aviation Editor of the *Post* of Birmingham, we have the following information concerning this active club in Alabama:

Two new world records for model airplanes were established in Birmingham this week by members of the Post Squadron, Junior Aviators. These records were with weight-rule stick and commercial models.

(Continued on page 48)

"O" Planes of the U.S. Navy

(Continued from page 5)

number of times, it certainly shows proof of its stamina. One feature of the Loening "Duck" is that they have quite a huge observers' cockpit. The writer has heard of one case where a Loening "Duck" landed and three husky Marines crawled out of the rear cockpit. Whether this is true or not is not known, as one can never tell where the Marines will come from.

"Ducks" have been flown a good number of years with dependable service. It is highly possible that this particular design has outlived its usefulness.

The latest models in this series are the Loening XO2L-1 and the XO2L-2. These are really again "cleaned up Ducks." These two ships are similar to each other and as they are still being tested, no data is available at the present time.

Pitcairn supplied just one type of observation airplane to the Navy. It was an autogiro. It was officially known as the Pitcairn XOP-1. This was the only type of autogiro the Navy experimented with, and when it crashed, it was decided not to experiment with it any further. This type of aircraft might have very good usage in connection with a carrier, due to its very slow landing speed. Possibly the Navy will experiment with them again sometime in the future.

Vought airplanes are a tradition in the U.S. Navy. Vought has supplied the Navy with observation aircraft since the very first inception of Naval Aviation. Their first model for observation purposes was the Vought VE-1 series. These were used as "Fleet Spotters" and the series continued right up to the VE-9 model. It was then redesigned and the Vought UUO-1 was produced. It was equipped with an Aeromarine U-873 engine developing 250 hp. This engine was an in-line water-cooled engine, but later an order was issued by the Navy Department stating that henceforth all aircraft used by the Navy would have to have air-cooled engines. The Vought UO-1 was then fitted with a Wright E-2 engine of 200 hp. This airplane was a good performer and several of this type were used in conjunction with the dirigible, "Los Angeles," in order to study how to hook on and off the trapeze slung underneath the dirigible. This is quite a strain on the airplane, as there are a number of forces being exerted upon the plane, while engaging in this maneuver. The airplane, however, was satisfactory and met the conditions favorably.

This plane was modified slightly and the UO-2 and UO-3 sprung from it. These airplanes were very sturdy and served faithfully. A special model known as the UO-4 was made for the Coast Guard which had just started to use airplanes in its service. This airplane completed many successful hours in this course and was only replaced when a later model was built. The next in the series of Voughts was the O2U-1 "Corsair," one of the finest observation airplanes ever built. The O2U-1 was a two-place open cockpit biplane with a slight sweepback to the upper wing. Not only was the ship good for observation purposes, but it was also fine for training and other utility purposes. It was equipped with a P & W "Wasp" of 420 hp. and the

Navy has used a large number of these planes. The O2U-2 is this model equipped with floats for use as a seaplane. Again it proved its value, as it was used in connection with catapult work. These catapults produce terrific strains on an airplane and sufficient to say, the "Corsair" stood up, catapult and all.

The O2U-3 and O2U-4 complete this series, and they are all similar in appearance, differing only by structural changes and new equipment such as controllable pitch propellers, floatation gear, carrier deck landing gear, and other new and improved accessories for work with the U.S. Fleet.

The next in this series is the Vought O3U-1 type. This model has been used in three different ways, landplane, seaplane and amphibian. In the case of amphibian use, the pontoon is fitted with the Grumman landing gear which retracts into the pontoon. The O3U-1 types are powered with P & W "Wasps" of 450 hp. Another convenience with the Corsair is that they are very easily interchangeable from wheels to floats for sea use, and vice versa.

The O3U-2 is almost similar to the O3U-1, but it is even cleaned up a little more. Several of these type planes are used by the men in the Bureau of Aeronautics on their tours of inspection of Naval Aviation Bases. This airplane is quite speedy and has a two-way radio communication system. The Vought O3U-3 is one of the latest in this series. It is also equipped with wheels or floats. It has a P & W "Wasp" engine of 550 hp., and is a good sturdy airplane. In fact, most of the airplanes in service with the U.S. Navy at the present date, that are used aboard Naval vessels with catapults, are airplanes of the O3U-3 type. This speaks very highly for this airplane. Going right along, we find the Vought O3U-4 which is still rather in experimental form. It is equipped with the new two-row radial engine, controllable pitch propeller, and almost all of the other new improvements.

Even later in the series is the XO3U-6. While this plane was being tested, it crashed and severely injured its pilot, who by now has recovered to see this type of plane manufactured for the Navy, minus the "bugs" which he helped find. Planes of the O3U-6 type are now being delivered to the Marine Squadrons on the west coast at the present date. Vought has also built the XO4U-1 but no data or information is available at all concerning this airplane.

The final ship in this series to date is the Vought XO5U-1, which is the amphibian that Vought has been working on, in competition with the Douglas and Curtiss models, which were mentioned earlier. Of the lot, the Vought is probably the most likely to be accepted. Vought has had more experience in building airplanes that will stand up on a catapult than any other company in the United States. It is needless to say that all of the above-mentioned are equipped with radios or they would be almost useless as observation types.

And so we have looked at those airplanes which comprise the observation branch of Naval Aviation. Much more can be written about these airplanes, data can be delved into, records can be mentioned, but one cannot devote too much time to one type

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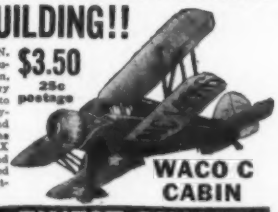

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5"	35c	5½"	50c	4"	20c	4½"	35c
5½"	40c	6¼"	70c	4½"	25c	5"	45c
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1¾" dia.	11c ea.

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1" long	5c
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TYPE E

1⅝" long	10c

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Something New 9 Cylinder

1" dia.	30c
1½" dia.	30c

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⅞" long....5c

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⅜"	4c	2"	30c	1⅛"	10c	1½"	25c
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Dia.	Drag Ring	Open Face	Closed Face
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2"	20	20	20
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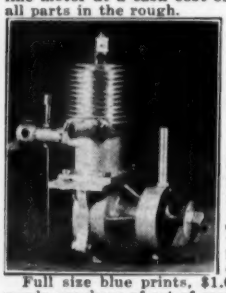

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without writing at least a page or two about it. Our Navy has some fine aircraft in its service today, and the Naval Airplanes are becoming finer and more advanced each day. Let us not be impatient with the men like the late Jim Collins and other Naval men who risk their lives daily in order to insure better and safer aircraft for this country. It is men like these who are the peacetime heroes of this country, and they are working ceaselessly so that our aircraft may continue to be the finest in the world. More power to them.

Principles of Good Model Building

(Continued from page 8)

by finer and finer grades. It is here that the templates are really used in earnest, to be sure of absolutely proper shape. The templates are made so that the cut out portion is exactly ½ of the total fuselage width with the joint line on top and bottom of the block to be used as a center reference line. When a template fits snugly against the curve of the fuselage and the top and bottom edges come exactly to the joint line, you are absolutely certain that the portion of the fuselage is correctly shaped.

When the outer shape is finished to your satisfaction and after a thorough sanding with very fine paper, it is time to split open the fuselage along the joint line. This should be done as shown in Figure 4, using only a double edge razor blade. Never use a knife, as the thickness of the blade will mar the edges of the joint. The razor blade is inserted straight down into the joint and worked front and back until it is well towards the center. It is most convenient to hold it with pliers. It may then be pulled out and moved along an inch or so and the operation repeated. Go around the entire joint line in his manner, and the two halves will split neatly apart.

The inside is then carved out with the gouges or the motor cutter. Hold the piece up to a bright light occasionally to see if you are too close to going through. The extreme nose end should be left thick and heavy, tapering back to as thin as 1/32" at the tail. For the first job, however, strive to obtain a smooth surface rather than paper thinness, as the latter can come only with practice. Do not worry a bit if the gouge digs through to the outside. Simply glue the chip in the hole and continue elsewhere until it dries in place.

The finish on the inside can best be done with sandpaper as this smooths off the ridges left by the gouge, without danger or waste of time. As usual, coarse paper is used first, followed by finer to finish the job. There is no particular end to be gained by working for an extremely smooth surface, such as that on the outside, except where the cockpit of the cabin is to come in the finished model.

The next step is to cut the necessary bulkheads for use inside the fuselage. Only two or three are needed in most cases, one or two of these being put where the wings and landing gear fasten in, and one back of the cockpit or cabin, where the model is usually gripped for launching. The bulkheads must be cut to fit, since, even though the outside is exactly to shape, the inside will vary slightly. They are made in halves, and each half has a central portion cut out to allow the rubber to pass through. When they are built up and glued in place, the two shells are fastened together. Smear glue on all edges liberally and put the pieces together. The best way to hold them is to wrap ½" wide cloth tape around the fuselage just tight enough to pull the edges firmly together, but not so tight that the fuselage is bent or crushed. The tape will probably stick to the glue that oozes from the joint, but it can be easily loosened with acetone. If rubberized tape can be procured, it is just the thing as it will not stick to the model glue.

When thoroughly dry, the tape may be removed and the joint and entire fuselage smoothed down ready for the finishing and painting. The next article of this series will describe the finishing process in detail.

A Silhouette Stearman Glider

(Continued from page 7)

M. Landing gear strut, (make two) 1/32" x 1/16" x 13/16", bamboo
N. Landing gear strut, (make two) 1/32" x 1/16" x 13/16", bamboo
O. Landing wheel, (make two) 1/16 x 7/16" diameter
P. Tail wheel, 1/16" x 7/32" diameter
Q. Slot for elevator
R. Launching hook, (music wire)
S. Elevator brace strut, 1/32" sq. ¾" long bamboo
T. Rigging wires, silk thread
U. Fillet strip, 1/16" x ⅛" x ¾"
V. Position for the nose weight
W. Prop, 3/32" sq. 1-7/16" long

Each part must be cut out right on the line. The fuselage is one piece. The white rectangles are the cabin windows and are painted on the completed fuselage in white or aluminum.

Camber both wings to the curve shown in the side views. This is done simply by holding each piece over steam or at a safe distance from a flame until it conforms to shape. Immediately, cut out the required amount of wing ribs for both wings and cement them in their respective positions as shown by the dotted lines on the wing plan.

The dotted line shown in the center of the lower wing designates the point where it is cracked lightly to attain the dihedral angle which measures for both wings ⅛". The upper wing is cracked in two places for its dihedral shown by the dotted lines nearest the cutaway on the top wing. Underneath these cracks a wing rib shown by the letter C is cemented. The ribs for the lower wing are lettered D. It is a good policy to paint all the larger parts after they have been cut out and sanded to shape, before assembling.

Attach the landing gear including tail wheel to the fuselage first. In attaching the landing gear, note the little stub lettered I. To each side of the fuselage this stub is cemented in a horizontal position as shown in the front view. It is 1/16" thick at the fuselage joint and tapers down to 1/32" at the point where the landing gear strut lettered L is cemented to it. The white mark shown on the side view of the fuselage shows also the at-

taching point. Struts M and N are cemented underneath the fuselage at the angle and tread which may be measured direct from the drawing. Cement a wheel to each side at a toe-in angle as shown. Cement the rudder and elevator in position next.

In attaching the wings, put the upper one in place first. The center section struts J and K are cemented in position before hand at the proper spacing and angle measurements which are taken from the drawing. The top wing center section ribs rest on the center section struts. Apply cement well around these joinings. Note the slight angle of incidence. When the cement has hardened, the lower wing is ready for attachment. Before doing so, however, cut out the fillet piece lettered U carefully. Apply a little cement, place the lower wing in position also at a slight incidence and replace the fillet strip snugly, dabbing a thin coat of cement all around.

The two sets of N struts are next set in position. The top of each strut rests underneath the outer wing ribs of the upper wing as shown by letter C in the front view drawing. The struts slant inwardly. Take measurements from plans for accuracy. Attach the elevator brace struts shown by the letter S underneath the elevator. See front view drawing Now check for dihedral, gap, stagger, incidence and general alignment.

Following is the paint job as used on the ship shown in the photograph: the wings, both tops and undersides, are bright aluminum. Rudder and elevator also are aluminum, scalloping in red on the rudder sides. The upper and lower part of the fuselage is black and the center part chrome yellow. A thin red stripe all around divides the black from the yellow on the fuselage. A thin red stripe is painted along the edging of the elevators above and below. A thin black line outlines the cabin windows as shown on the drawing. The wing and center section struts are bright red. Landing gear struts and tail wheel black. Elevator brace struts red.

Attach the wire launching hook shown by letter R in position. Carve out the prop and paint aluminum. The prop is made for show purposes only and should not be attached when gliding the model.

For the nose weight, use a strip of heavy silver foil wrapping. This piece is cemented in front of the cowl designated by the dotted lines. By easy gliding stages, you can determine the correct amount of foil until the model lands consistently on all three. It is not necessary to warp the elevators for climbing as the rising air currents will take care of that. If you want it to perform tricks, then turn them up slightly. Landing and flying threads are not necessary but if you wish you may install them.

The flying wire or thread is shown by letter T. This is attached at the top front edge of the H strut and reaches down to the landing gear stub. The landing wire is attached at the front edges of both the center section struts shown by letter J and down at the lower end of the wing strut shown by letter H. A set of rudder brace wires grace the elevator and side of the vertical fin.

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The Development of the Fokker Fighters

(Continued from page 9)

and the Junkers-Fokkers Werke, Ltd., of Dessau. Their motor products, though not produced in great numbers, show to what ends the motor controversy had driven some designers and manufacturers who had in mind the commercial and military defense of their fatherland.

With the motor trouble slowing down the industry, replacements were necessarily late in coming. In order to maintain full battle strength in squadrons, it was necessary to re-commission old, obsolete machines deserving of retirement. This explains combat reports in which pilots relate meeting large squadrons of machines: ". . . out of the sun dropped a flight of red-nosed Fokker D.VII machines, followed by a dozen Albatros scouts. In the melee were also some small, tricky triplanes, about 30 machines in all."

Time was being wasted by this official dickering, time which was costing Ludendorff men and morale along the Western front. Time it was too, that bore down on the old equipment of the German air forces.

Foreseeing trouble in the near future, Fokker made two moves that, had their complete intent become fact rather than plan, might have saved the situation from a humiliating decay. First Fokker approached his ace friends in the von Richthofen staffel and solicited their help in calling for a new competition for single-seater fighting ships. According to German records ". . . inasmuch as production of chaser types planned for concentration in the month of July cannot possibly be conceived in due time, another competition will be held during the month of April in which there will be no limitations in size of airplane, engine or power; to be governed by the same competition rule in choice of airplane, as governed a similar chaser competition earlier this year."

Thus Fokker seized the opportunity of availing himself to his friends' influence in Berlin.

Secondly, Fokker shrewdly designed his new airplane to be entered in the competition around the 110 hp. Oberursel rotary motor of which he was sure of an ample supply. It will be remembered that when production of the Fokker DR.I began, Fokker bought a controlling interest in the Oberursel firm in order to supply himself with motors.

Late in March, Fokker prepared his Schwerin factory for production, pinning his faith in his new product. The factory fairly hummed with activity. Carloads of fresh materials were arriving daily, engines from the Oberursel concern in Frankfurt were received on the loading platform. Propeller boxes bearing the stamped names of Axial and Heine were already stacked high in one of the large Fokker sheds.

In the engineering department of the Fokker plant, draftsmen penned and compassed metal fittings. Sample castings and stampings, each tagged and bearing the part number, inspector's name and drawing number, were lying about on the drafting tables.

Over to one side, in his office, Anthony H. G. Fokker busied himself with official documents, stress calculations and production cost estimates. Before him was the center of all attraction in its production drawing form: the airplane he would enter in the April competition.

On the lower right hand corner of the drawing, in the box identifying the draftsman, inspector, serial number and drawing number, were these words in large bold letters: "FOKKER-KAMPF-EINDECKER E.V."

Approximately two weeks was spent in the construction of the E.V. The design, in the main, was not a new one; a machine identical to the E.V with the exception of the motor was the Fokker V.27 described in the last installment. A simple job of weight redistribution to carry the lighter Oberursel motor was the major change. This delay gave Fokker's competitors a slight edge on his entry in regard to duration of test.

Pfalz Flugzeugwerke, Speyer-on-Rhine, had completed a sleek biplane machine shortly after the D.VII came out, carrying characteristics of both the Fokker D.VII and the popular Albatros D.V. This new airplane was known as the Pfalz D.XII. Albatros entered several new types, Rumpler tried the field again with his D.II, Siemens-Schuckert brought

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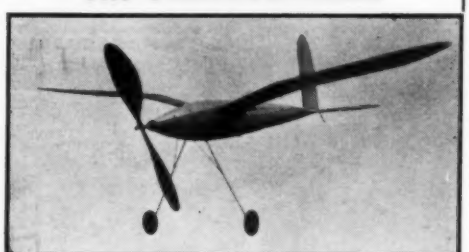

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out their D.IV model, and Roland their D.XIV, D.XV and D.XVI types.

Kondor Flugzeugwerke, located at the Gelsenkirschen-Rotthausen airdome, countered with two models, the E.IIIA, and the D.VI, L.V.G., D.VI and Daimler L.IX competed in the field. Dornier entered his lone D.I biplane.

Fokker's competitors, having their planes in the hands of the test pilots, thought little of his consequent pressure during the first few days of testing. Most of the competing ships performed much better than their predecessors in the first contest.

Machines were spun, looped, rolled, dived, pancaked and generally banged around by the great aces. Several types proved their mettle by being picked as sure winners of the fat contracts awaiting the victor. These were the Pfalz D.XII, the Dornier D.I and the Siemens-Schuckert D.IV.

Reckoning without the Fokker E.V, however, must have caused many a grey hair in Berlin. When the E.V Fokker monoplane finally did arrive, it fairly created a sensation. In the take-off tests, it left the ground some 50 feet short of its nearest rival, the S.S. D.IV. The D.IV was equaled by the E.V in rate of climb, 1500 feet the first minute, but in maneuverability the Pfalz D.XII was the only rival. Dornier D.I held the high hand for diving, the Fokker E.V running a close second.

When the time came for voting for the best all around machine suitable for fighting, the test pilots unanimously chose the Fokker E.V, even as enthusiastically as they had elected the D.VII several months before. Thus in one stroke Fokker again dominated the pursuit field. Nothing could stop him now, he thought; he even had the motor situation beaten.

Early in May, 1918, the Fokker D.VIII, as the E.V was renamed, was flown to Aldershoff for official loading tests before Berlin authorities would sign and approve contracts for mass production. During these tests, government engineers found that in the D.VIII wing as designed by Fokker, the rear spar was not as strong as the front spar. Because of a standing requirement laid down by Air Force engineers stating that both spars be of the same strength, Fokker was instructed to re-enforce the rear spar to equal the front spar. This ruling was laid down for the regular wire-braced wings, but since there was no ruling for cantilever construction, the D.VIII wing had to meet the requirement just the same.

Properly strengthened, six D.VIIIs were sent to the Front on regular service. Jagdstaffel 23 was the one so fitted in June, 1918, the D.VIIIs going along with the D.VIIs to this squadron.

But the reputation gained by the D.VIII during its competition runs in April did not stand up under the service conditions of June. Within two weeks, three of Germany's pilots fell to their death; the reason told to members of neighboring squadrons was that archie bursts brought down the monoplanes. The truth was that the wings had collapsed during long dives. The remaining three D.VIIIs were grounded, dismantled and sent to Aldershoff for investigation.

Official Germany was stumped. The stress tests run on the D.VIII wings met requirements, yet these accidents, or failures had occurred. Cries from the Front demanding D.VIIIs in spite of their potential weakness did not drown out the statement from Berlin that ". . . production in the Fokker works, because of certain factory alterations, will not reach its maximum for several weeks."

During those several weeks, Fokker figured and tested his D.VIII wings, took new wings out of production and compared them with wings of the original six machines. Then as mysteriously as the accidents occurred, the solution presented itself. In the Fokker wings, the front spar was designed to carry a greater load than the rear spar. In the original machine, any flexations would be uniformly distributed in both spars; both members would bend in proportion.

But the strengthening required by the spar rule had thrown this proportion way off. The front spar flexed normally, but the rear spar, stronger than necessary, remained rigid. The result was the angle of incidence at the wing tip increased so rapidly during a dive that pressure thus created snapped both spars!

By the time this theory was proven, August, 1918 was coming to a close. Production of the D.VIIIs with wings built according to original Fokker specifications began in September. The 24th of

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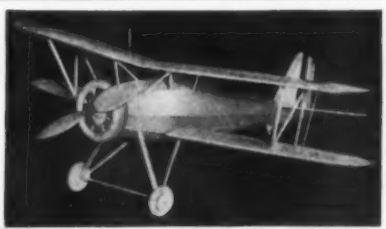

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⅛x¼ .06	3/16x¼ .08

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1x2x36 .20	2x6x36 .35
1x6x36 .45	2x8x40 .45
2x3x36 .45	

Prop Blocks

¼x¾x6	8 for .05
¼x¾x6	4 for .05
⅜x1x7	3 for .05
⅜x1x8	3 for .07
¾x1¼x8	3 for .08
¾x1¼x10	2 for .09
¾x1¼x11	2 for .11
¾x1¼x8	2 for .11
¾x1¼x11	2 for .12
¾x1¼x12	2 for .13
¾x1¼x13	2 for .15
¾x1¼x14	2 for .17

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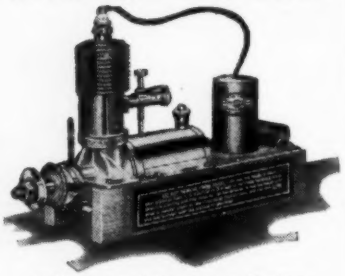

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CRESCENT MODEL AIRCRAFT

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that month saw Jagdstaffel 23, 1 and 11 actually outfitted with Fokker D.VIIIs. Promises were made to outfit Staffel 35 as quickly as production allowed.

Lieutenant Rudolf Stark, leader of Jagdstaffel 35, in his book "Jagdstaffel," makes some very interesting remarks in connection with the promise that his squadron "will be fitted with Fokker D.VIIIs in the near future."

He says, in part, "Several of the neighboring Staffels were better off. They flew quick-climbing triplanes, or the new Fokker D.8, the flying capacity of which was something almost like a fairy tale. They always hauled down one or two from the English squadrons and put the rest out of their stride."

When on a visit to an aircraft park to get Fokker D.VIIs for his outfit, Lt. Stark relates, "We see every possible type of machine in the hangars. Among the single-seaters are a couple of new machines which are completely new to us. . . . Fokker monoplanes with rotary engines. Wonderful things that look so light and nimble, Fokker's very latest invention. Jagdeschwader 1 is to fly them, but for the present they must remain in the sheds because they are to be fitted up with a few improvements."

The "improvements" mentioned were the solutions to the D.VIII wing-breaking episode, the ships he saw were the ones grounded.

He continues, "At last the news arrives that our scout group is to get the new Fokker D.VIIIs."

And while these various squadrons awaited the new D.VIII machines, the Pfalz D.XII, second place winner in the April competition, shared the Front with the D.VII.

Contrary to popular belief, Fokker D.VIII monoplanes actually saw service at the Front. For just one week the squadrons fitted with them rained hail-lead on the few Allied machines so unfortunate to meet up with them. By the end of that week, November 1, orders were received to stand by. November 3rd in many quarters brought the order for retreat. Consequently, the Fokker D.VIII was actually de-commissioned by retreat before it had a chance to show its mettle.

Build and Fly the Pfalz "Pursuit"

(Continued from page 11)

tail and the rudder ribs. The trailing edge of the tail is made from 1/32"x⅛" hard balsa.

Cover the tail and rudder in the usual manner. It will be necessary to do the tips and sections of the rudder separately. Glue the tail in the last section of the fuselage as shown in the drawings; it is necessary to cut a small hole in the tail for the upright in the rear of the fuselage. The vertical fin or rudder is cemented on in an upright position on the top longeron.

Landing Gear

Make the struts from hard 3/32"x5/16" balsa; plate 4 gives the exact size and shape for each pair of struts. Be sure to have one left and one right pair of struts and also to cut the ends in order that they fit easily onto the fuselage. The axle is cut out of a soft piece 5/32"x⅜" wood in the ends of which are inserted pieces of medium-heavy music wire for the axles. The wheels are of a heavy variety so that they will balance the model and make it more stable in flight. Refer to the drawings for the exact location of the gear. Bamboo and balsa make up the tailskid which is cemented on the rear of the body.

Wings and Propeller

From 1/32" sheet balsa of medium weight, cut thirteen ribs for the upper wing and ten ribs for the lower wings. Spars are cut 1/16"x3/16" for the upper wing and 3/64"x⅛" for the lower wing. It is important that the spars fit snugly in the notches of the ribs so that a true wing will result. The leading edges are now made by sanding one edge round on pieces of 3/32" square medium balsa. The trailing edges are 1/32"x⅛" hard balsa sanded to a triangular shape to finish out the streamline shape of the ribs. The wing tips are bent from 1/32" square bamboo and stuck into the leading edge and into the notch in the trailing edge and glued to stay! Small strips of wood can be put on the upper wing to give ailerons and with a little ingenuity, the ailerons can be movable. A semicircle of bamboo is made and glued in the center section of the upper wing. Of course the middle rib must be cut short; the upper wing rib detail is seen on plate 1. The ⅛" square balsa sticks are put in the lower wings to support the struts. Cover the wings in the same way as you did the tail assemblies. The interplane struts are cut and assembled as in plate 3.

A flying propeller is carved in the usual manner for the plane from a block of medium wood; see plate 6 for the shape. Round the tips and bend a shaft out of No. 14 wire (.033) and insert it in the

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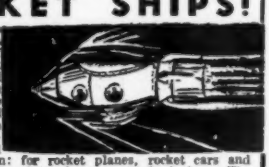

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prop spinner. To lessen friction, two washers and a bead are placed between the prop and nose plug. Four loops or eight strands of 5/32"x1/30" brown rubber constitutes the power for the Pfalz.

Color and Final Assembly

The author's model consisted of a red body and rudder, yellow wings and tail, and was trimmed with black. Naturally the scheme is optional with the individual, but it would be interesting to use the camouflage type of coloring. The German crosses are black with white trim while the other coloring is made from thinning lacquer and spraying it on or putting some regular dope on the plane. After coloring, the wings can be placed on the plane. The lower wings are glued on the wing root ribs as shown in plates 1 and 5. Then the struts are glued in position and the upper wing is put on. Black thread is put on which adds both to the beauty and strength of the model.

Now the model is ready to fly and is done by getting it to glide properly first and then winding her up for a flight. More detail may be put on the model just as the builder sees fit, such as machine-guns and bright insignia.

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Applying Power to Gain Duration

(Continued from page 23)

and by streamlining all parts of the ship around which the air passes.

Often the increase or decrease of the factors of the formula cause an increase in the drag of the ship. For instance, if the propeller blade area is made excessively large, it will produce considerable drag when the model is gliding, even though a free wheeling propeller is used. For facts concerning proper propeller area, read the chapter on propellers which is included in the May to October 1932 issues of MODEL AIRPLANE NEWS.

A summary of facts contained in this chapter follows:

Summary (Chapter No. 4)

1. The known sources of power for models are: spring motors, compressed air or carbon dioxide, rubber bands and gasoline engines.

2. Rubber bands are the simplest source of power and give the most power for their weight.

3. Gasoline engines serve as a fine source of power for large models. A complete power unit of this type can be obtained that weighs twenty-two ounces and develops 1/5 hp.

4. Factors to be considered in determining the value of a source of power are: (a) amount of torque or twisting effort developed; (b) the length of time it may be developed continuously; and (c) the efficient application of power through proper coordination of the motor and the propeller through which the power is delivered.

5. Torque is the twisting or turning effort developed by the motor. It is equal to the force imparted times the length of the moment arm (distance from axis of rotation to the point of application of the force. ($Q = F \cdot M$).

6. The speed of propeller rotation is proportional to the cube root of the torque, ($V_r = K\sqrt[3]{Q}$).

7. The thrust (T) is proportional to the square of the velocity of propeller rotation V_r. ($T = KV_r^2$).

8. The more turns that can be put into a motor of a given number of strands, the longer the propeller will continue to turn and deliver power.

9. The energy output of a rubber motor is proportional to the amount of work stored in the motor when wound.

10. *Work* is the product of a force acting through a given distance. $W = F \cdot S$. W = Work. F = force. S = distance.

11. *Power* is the rate of doing work.

$$P = \frac{FS}{t} = FV. \quad (t = \text{time.})$$

12. The faster a propeller turns when driven by a given number of strands of rubber, the faster it will use up the stored work and consequently the more power it will deliver.

13. With a given number of strands, the smaller the propeller, the greater the power it will deliver, the pitch and area of the propeller remaining constant.

14. The less the pitch of the propeller, the area and diameter remaining constant, the greater the power developed.

15. Flight capacity of a model is pro-

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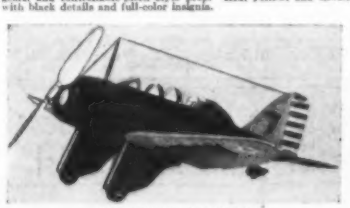

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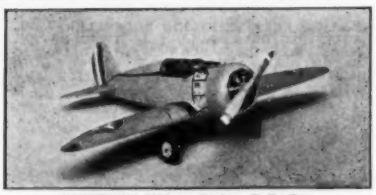

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portional to the amount of work that can be stored in the motor or motors.

16. The amount of work that can be stored is equal to the average torque times 2 Π, times the number of turns stored in the motor, or Ws=2 Π·Q·T. (Q=average torque).

17. The factors which influence the amount of work that can be stored in a motor are: (a) the number of strands; (b) the size of the strands; (c) the length of the motor; (d) the quality of the rubber; (e) whether or not it is lubricated.

18. As a rule lubricating the rubber of a motor increases the number of turns it is possible to store in it.

19. The smaller and fewer the strands used, the *less* is the increase in the number of turns possible due to lubrication of the rubber.

20. In fine strands 1/30" x 1/30" in cross section or less, *lubrication does not increase* the number of turns it is possible to store.

This summary will be continued in the December issue. Chapter No. 5 will follow the summary of Chapter No. 4. This chapter will deal with "The Procedure of Design," telling you how to design your model for any particular purpose.

Building the Flying Twin Autogiro

(Continued from page 26)

nated dimensions and has the familiar fittings glued to it.

Bamboo, 3/64" square, is used for the empennage frames. The rudder is built onto the rotor spar with the rear portion offset ⅛". Bend the stabilizer ribs to the section given to the end view. Notice the balsa block which elevates the trailing edge 3/32". After gluing to the motor spar, cover with tissue paper.

Landing Gear

By having the landing gear clipped onto the motor spar it may serve in the usual manner for taking off and landing, also as a movable weight which allows for greater flight adjustment.

From a front elevation the arrangement resembles an "A." The two round-tapered balsa legs are joined at the apex with a bent sheet aluminum clip which clamps over the motor spar. A crossbar of bamboo is glued between them with a .015" piano wire brace "b" protecting the rear from hard knocks. L-shaped pieces of wire used as axles for the ¾" celluloid wheels have a drop of cement at their free ends to secure the wheel.

Propeller

As the rotors produce an unusual amount of lift, they also have much resistance. To overcome this drag and still have a propeller that will not result in too much torque, low pitch is combined with a reasonable amount of blade area. A block ⅝"x1"x8" is shaped to give dimensions. From the blank, a right-hand propeller is carved in the usual manner. After sanding to a 1/16" thickness at the hub, to 1/32" at the tips, the blade is trimmed to the shape of the template provided. The propeller leans forward ¼" at the tip. This is done by bending the thrust bearing slightly.

Assembly and Flying

After clipping on the landing gear, rotor assembly, attaching propeller and two strands of 5/32"x1/30" rubber, the ship is adjusted by sliding the rotors fore or aft, until it descends vertically with the nose slightly lower than the tail.

If the correct adjustment cannot be secured because of interference with the propeller by the rotor blades, use the landing gear as ballast. Torque can be controlled quite effectively with the rudder.

A ship built correctly with these plans and having proper adjustments should reward the owner with the steepest climbing model of his career.

On the Frontiers of Aviation

(Continued from page 17)

are available to the private flier. Cruising speed is 210 m.p.h. and 212 m.p.h. respectively!"

A recent issue of United Aircraft's publication, "The Bee Hive," contained the following caption: "A military version of the Sikorsky S-43, particularly adaptable to patrol and bombardment uses, is now available and is attracting much attention in military circles."

The new Burnelli twin-engined plane for Clyde Pangborn, has passed tests with flying colors. The ship, which Pangborn will attempt to fly around the world nonstop next summer, refueling in the air, has been kept at the Red Bank Airport, N.J., during tests. I had the opportunity of inspecting the entire ship during its stay there. It is almost identical to the Burnelli transport described in the June issue of MODEL AIRPLANE NEWS.

Clyde Pangborn took the ship up in the morning to a height of two miles and reached a speed of 240 m.p.h.! The ship was found to be very stable and fulfilled designer Burnelli's expectations. Only minor modifications will have to be made and then the fuselage will be filled with huge gas tanks for the long journey. During the morning test, a slight oil leak occurred in one of the controllable pitch props and the oil spread over the bottom side of the wing directly where the wing strut fairs into the wing. It was noticed after landing that when the oil had reached the leading edge of the connection of strut and wing, the oil flared out about a foot on each side of the strut. This showed that there was not a smooth air current flowing around the connection. To correct this a much larger fillet will be built at the connection of wing and strut, thus adding a few more miles to the speed of the giant plane.

Next month MODEL AIRPLANE NEWS will run a special National Air Race issue! In it will be a full description of planes and events at the 1935 National Air Races at Cleveland!

Though Mr. Eugene Vidal's tactics as head of the Bureau of Air Commerce have been subjected to some criticism by the aviation industry, his efforts in regards to developing a flivver plane are meeting with some success. It might be pointed out to the sportplane manufacturers that if it had not been for Mr. Vidal we would not have the many varieties of low cost sportplanes that are now making their appearances—and probably would not have had

planes with such performances in many years to come. The Hammond plane was fully described in the last issue of this publication. It is now back in the factory for slight modifications in order to raise the speed of the plane. Otherwise its performance has been very satisfactory. Dean Hammond, its designer and builder, is only 26 years old, so one can see the opportunities of holding a high position at an early age that aviation now offers.

Waldo Waterman's flying wing for the Bureau has met with extraordinary success. Its flight of thirty-one hours flying time from coast to coast proves the excellence of the ship. The small wing has a pronounced sweepback, giving it a V-shaped appearance. There being no tail, the rudder and fin are located at the wing tips. The two-place fuselage is underslung and contains a Menasco engine in the rear that whirls a pusher propeller. Two wheels are in the rear and one in front to act as landing gear. The ship can come to a stop almost as soon as it touches the ground. It is an impossibility to stall or spin the Waterman and it is ideally suited for the automobile driver of today. Many more of these light planes are to appear soon.

Bellanca has produced the first of their new 1935 Pacemaker series.

Stearman has received an order for 26 of their new training planes from the Army.

The Allison Manufacturing Company is about to begin production of their new 1,000 hp. liquid-cooled engine in their new giant factory.

A few years ago Russia produced a four-engined bomber of excellent design. After tests had been completed on the huge plane, it was only a matter of a few months before whole squadrons of like design made their appearance that put all other air powers to shame. It has not been until very recently that any country has had the money and initiative to produce a four-engined bomber, and it was finally the Boeing Company of our United States which came forth with such an airplane. The plane is so large that special carriers had to be used to haul the plane out of the company's hangar at Seattle, Wash. It had to be brought out sidewise. The Army Air Corps will have their hands full when they have a hundred or more of these planes to operate. It will certainly give the Government reason to accept the Wilcox Bill which calls for several new giant air bases throughout the country.

The bomber, known as Model 299, is of typical Boeing all-metal construction. The tail wheel retracts as well as the two forward wheels. Automatic pilot, two-way radio and radio homing compass are some of its cabin equipment. The accompanying three-view drawing of the 299 illustrates its swift lines and the bullet-belching ability of its five gun turrets. Pratt & Whitney Hornets make up the power plant. It does not take much hesitation to agree that the Boeing is the fastest bomber in the world. It carries 1,500 gallons of fuel!

The plane cost about $500,000 to perfect, and this probably explains the reason why the Boeing Company showed a large net loss for the first half of this year. A commercial version of the 299 is undoubtedly well under way at present.

The latest news is that Glenn L. Martin is contemplating a huge flying boat to compete against the proposed 400-foot Sikorsky!

How to Build a Scale Model of the Boeing Model 299 Bomber

The model is most easily made with balsa wood, which may be purchased at almost any model shop or department store. Get dimensions for stock from plans.

If you wish to square-off plans, connect corresponding dots on border lines. Each square will equal four square feet.

Draw the outlines of the top elevations of the wing, fuselage, horizontal tail surfaces, engine nacelles and the side elevation of the rudder and fin. Cut around these outlines with a jig-saw or razor blade. Go over edges with sandpaper. Taper down the wing as shown in front view and cross-sections, using a small, sharp chisel. Draw the side view of the fuselage and cut. Then round out the fuselage as shown by cross-sections on Plan No. 2. Sandpaper the fuselage to smoothness and then shape out the gun turrets and ambroid them to its sides. Shape out all the other parts as shown by plans with your razor blade and sandpaper to smoothness. It is best to use

REAL LOW PRESSURE WHEELS FOR MODEL PLANES

M & M Wheels are miniature pneumatic tires and wheels combined in one. M & M's are the only wheels for model planes that have valves and can be inflated and deflated. They are recommended by leading model authorities, and used by champions for protection and short race take-offs. After spending many hours building your Model, why not insure and protect it with M & M Wheels? They will add that final touch to your model that only M & M's can give.

MODEL BUILDERS: If your dealer does not carry M&M Wheels send us his name.

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Size 4½"x1¼" for Models weighing up to 20 pounds
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Both sizes have 5/32" hole through hub. Approx. weight 3 and 4 oz. pair.
PRICE: both sizes $4.50 pair Postpaid.
All wheels for gas models are now equipped with our newly developed M & M special heavy duty valves.

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1¾—1¾—1¼—1⅝"—Wt. approx. 1/10 oz. pair.
PRICE $0.50 Per Pair Postpaid.
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OBTAIN: M & M WHEELS from any leading dealer, or send direct to the factory. FOR AIR MAIL ADD 11c. on small sizes. Send Money Orders or CASH only. When sending cash fasten coins to letter with adhesive tape. If located in Washington add State Tax.

M & M MODEL WHEEL CO.
325 North 79th Street, Dept. U.11, Seattle, Washington

MAKE A FLYING MODEL OF THE CURTISS "FALCON"

SEND FOR FREE BLUE PRINTS—they're accurate, complete and easy to follow. Use DUCO Cement to make your model stronger and more lasting. To get blue prints just send your name and address with the red disc or the green carton from a regular 25c tube of Duco Cement. On sale at drug, hardware or stationery stores. Just write to DU PONT, Dept. F-5, Wilmington, Delaware.

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DU PONT DUCO Household CEMENT

BUSINESS IS GOOD—WE DON'T WAIT FOR BUSINESS—WE CREATE IT

by using the best grade of materials obtainable in making up each Douglas-designed kit. It's a pleasure to receive so many letters from model builders in all parts of the country, telling us of the fine kit value, also ordering another Douglas kit.

ORDER A DOUGLAS-DESIGNED KIT TODAY AND SEE THE DIFFERENCE

DOUGLAS-DESIGNED "UNIVERSAL SPEEDSTER"

This new Douglas-Designed speed model has absolutely EVERYTHING you need. ALTITUDE—SPEED—ENDURANCE, perfect GLIDE and M. & M. Airwheels for smooth landings. Don't miss the thrill of flying this easy-to-build TRIUMPH of the air. Average flights 3000 feet.
Span 30". Length 25". Wt. 2 oz. Kit contains full size plans, wing ribs notched and cut to shape, body formers and other parts clearly printed on "AAA" balsa, turned spinners, glue, dope, red tissue, rubber motor, special designed real FREE WHEELING PROP. CUT TO SHAPE. WORKS perfectly every flight.

Complete Kit only $1.50 P.P.

M & M MODEL WHEELS

For Gas Models 3½"x1⅝" Wt. 3 oz. For Models up to 10 lbs. $4.50 Per Pair Postpaid. 4½"x1⅝". Wt. 4 oz. For Models up to 20 lbs. $4.50 per pair postpaid.

For Rubber Powered Models 1¾", 1⅝", 1½", 1⅜". Wt. 1/10 oz. 60c Pair Postpaid. 1¾"x2", 2¼", 2½", 2⅝". Wt. ½ oz. 60c Pair Postpaid.

Everything to build Model Airplanes. Write for New Price List. DISCOUNTS TO DEALERS.
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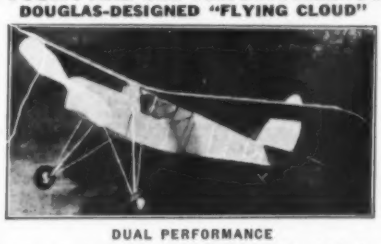
Send Money Orders or CASH only. When sending cash fasten coins to letter with adhesive tape.

DOUGLAS-DESIGNED "FLYING CLOUD"



DUAL PERFORMANCE

Flight tested by Prof. T. N. de Bobrovsky. Material for two complete wings. One with Gottingen 387 Wing Section for climb and endurance—M-6 Section for speed and distance. This model is the result of nearly a year of experimental work and for consistent flying this model is in a class by itself.

Wing span 36 in.; length 24 in.; weight 3 oz. Full size plan, wing ribs cut and notched. Nose block shaped and drilled for 1/16 inch tubing. Special Douglas-designed prop., shaped out. Sheet celluloid for cabin windows, two colors of tissue, all strips cut to size, parts requiring sheet balsa printed out, glue, clear dope, and motor rubber, and free wheeling prop. device.

Complete Kit with M & M Airwheels $1.75 P.P.

GAS MODEL BUILDERS send us your list of materials for estimates and gas model price list (7) different woods listed. 3-ply sheets Balsa center spruce sides 1/16" to 1/4" in thickness. These sheets are very strong and light weight. Send for sample.

DOUGLAS MODEL AIRCRAFT CO.
1400 North 45th St., Dept. H, SEATTLE, WASH., U.S.A.

coarse sandpaper first and then fine sandpaper.

Brush all dust off and then begin the paint job. The plane is to be painted the standard Army Air Corps colors: wings, stabilizer, elevator and fin are to be colored yellow, the rest of the model olive drab. The black bands on the rudder and the black circle in the center of the insignia on the wing should be painted red, the vertical band on rudder and background of insignia blue, and the remaining bands and stars white. Windows may be painted white with black panels. Several coats will have to be applied before a smooth finish is obtained.

When paint has dried begin the assemply of the model. Cut the ends of the wing so they will fit snugly into sides of fuselage. Lay the fuselage on a flat surface, and then, applying plenty of ambroid, join the wing sections to the fuselage. Lay blocks under the wing tips to give the wing the correct dihedral. See front elevation. Fit the four engine cowls and nacelles to leading edge of wing and then put on the tail units. Be accurate. When connections have dried, lay model on its back and put on landing gear. This may be done with strong balsa strips, using plenty of ambroid.

Touch up all connections with ambroid and paint and the model will be completed.

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Name .....

Age .....

Street .....

City..... State.....

Airplane Observers Contest Winners

(Continued from page 29)

neatness compared to other contestants. We regret that everyone cannot receive a prize, but obviously that is impossible.

Perhaps this contest has served a rather obscure but important step in the building of character; that is, learning to lose gracefully. It is an axiom of success that one cannot be truly successful through his own merits until he can meet disappointments with good grace.

We hope that this will be some consolation to the graceful losers, and we wish them better luck next time.

The winning entry appears at the head of the page. The winners are as follows:

1. Donald Chenoweth, 214 North 19th St., Richmond, Ind.
2. Bill Haddock, 2728 Miles Ave., Dormont, Pittsburgh, Pa.
3. Irving M. Bailey, 621 Elm St., New Haven, Conn.
4. Stuart Collins, 9939-211 Place, Queens Village, N. Y.
5. Robert S. Burke, 29 Middle St., Fairfield, Conn.
6. Bruno Pocius, 2530 North Long Ave., Chicago, Ill.
7. Eugene O. Blevins, 29 Jackson Ave., Everett, Mass.
8. Edward G. Ireland, Jr., 4814 Darrah St., Philadelphia, Pa.
9. Edward Jarzombek, 3078 Davlin Court, Chicago, Ill.
10. John Preis, Oradell, N. J.
11. Nerus Y. Upshaw, 811 North Greenwood, Tulsa, Okla.
12. Joseph Cherry, 227 Belmont Park East, Dayton, Ohio.
13. David Keller, 3706 Georgia St., San Diego, Calif.
14. Kenneth M. Sumney, Carnegie, Pa.
15. Robert Roller, 303 Lincoln Ave., Youngstown, Ohio.
16. Griffith Bedworth, 78 Elmwood Ave., Waterbury, Conn.
17. Warren P. Manger, 117 South Drive, Eggertsville, N. Y.

MODEL AIRPLANE NEWS wishes all these young men the greatest success in an aviation career.

Airways—Here and There

(Continued from page 38)

Both the record breakers made fine showings at the National Model Races in Cleveland last year. They have 3,000 boys and girls building model planes in and near Birmingham now.

Philadelphia Model Airplane Association

Recently William Wert, Jr., of 5380 Charles St., Philadelphia, Pa., who is a 14-year-old model airplane builder, was a big winner at the Championship Model Meet of the Association. The contest was held in Convention Hall. Wert is a member of the Caterpillar Flying Unit. He won the A. J. Drexel Biddle Cup. The Meet, which closed the sixth Philadelphia Model Airplane Association's season, saw thirteen local and three national marks established. During the season Wert won fifty-three points and he captured two first places in the contest. The three national marks of the season were established by John Haw, Mayhew Webster, both of the Northeast Unit; and William Latour of the Kendrick Recreation Center.

Plainview, Texas

A contest was recently held at Plainview, Tex., under the sponsorship of the Oberthier Modelcraft Company. There were twenty-two entrants. Though the wind and weather were against excellent flights, the meet was considered a decided success. In the Glider Event the winners were: Raymond Wilks, first; W. C. Vaughn, second, and Frederick Hall, third. The best time of the meet was made by Hall's model with a flight of 31.8 seconds. In the Flying Scale Event, Hall won first place and Tom Gibbs was second. Hall also won the Exhibition Scale Event.

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MODELS—MATERIALS—PLANS

FREE—3" Celluloid Motor to first 1000 dealers sending 15c for 1936 Wholesale Catalogue. Advance Model, 146 William St., New York City.

MICROFILM Cutter: Cannot burn thinnest spars. Practical, indispensable; plans and essential part only twenty cents (no stamps). Aerolab, 1933 Fairview St., Easton, Pa.

STOP! Look! Listen! Send for free plan and the best prices you've ever seen. E. & M. Model Aero Shop, 4802 Clarendon Rd., Brooklyn, N. Y.

¾" SCALE Blueprints. B/J P-16, 1930 Laird, 1931 Laird. 25c each. List 3c. Great Lakes Model Engineers, 15436 LaSalle Avenue, Detroit, Michigan.

BUILD Modern flying Seasleds, 25" models. Send 75c for Multicopy Plans. Free! Airplane Kits to first fifty who reply. Hoyesen, 754 Maplewood Ave., Bridgeport, Conn.

MODELBUILDERS, Write for price list. Amazing free offer given with every supply order. Kearsarge View Model Supplies, Andover, New Hampshire.

FREE Price List. Your address on a post card brings it. Model Aero Shop, Huntington, N. Y.

DEALERS, Clubs, Schools: Want larger profits? Send for Wholesale Price List. Model Airplane Utility, 5307 New Utrecht Ave., Bklyn, N. Y.

JOBBERS! We manufacture balsa gliders to retail at one and five cents. Write for quotations. State quantity. Model Airplane Utility, 5307 New Utrecht Ave., Bklyn, N. Y.

CHRISTMAS SPECIAL. One dozen Balsa Strippers and a 3 cylinder Aluminum Compressed Air Motor $3.75 postpaid. Expires Jan. 1st, 1936. One Stripper only 50c. R. Hetherington, 4526 Corliss St., Los Angeles, Calif.

RACING Car Model (Not a toy) Kit $2.75 p.p. U. S. A. Contains pine body, finished wheels, enamels, aluminum, etc. Detailed plans full size. Send dime for photo and description. The Scale Model Shop, 58 W. State St., Battle Creek, Mich.

36" FLYING Curtiss Falcon Construction kit. A real model when completed. $1.00 postpaid. Triboro Model Supply, 27-09 Newtown Ave., Astoria, L. I.

THREE Foot ready shaped balsa sailplane. Assembled in twenty minutes. 25c coin postpaid. Postcard brings price list containing free offer. Whirlwind, 104-51 88th Ave., Richmond Hill, L. I.

DEALERS and Clubs—Write for our price list of Model Airplane Supplies. We guarantee you won't be sorry. Our supplies the best! Wholesale only! United Model Supply Co., P. O. Box 351, 16 Court St., Brooklyn, N. Y.

LONG Established complete Model Airplane Factory for Sale Outright. Splendid opportunity to enter the broad field of Model airplane and Supply manufacturing. Write, 170 Broadway, Room 1216, New York City.

AIRPLANES

NEW Aeroplanes, only $25.00 down. The famous 98 Trainer, one and two place, beautiful midwing design, welded steel fuselage $98.00 each and up. Send 25c for more information. Hibbs, Dept. 4, Fort Worth, Texas.

ADVERTISED MODELS ARE BEST

Of the 500 model manufacturers doing business in this country today, the 50 advertising in MODEL AIRPLANE NEWS are the largest and oldest. These fifty firms have reached their present positions because their models are good, their prices fair, and their service excellent. Order from them with confidence.

"900 Foot Flights" "Fly Like Birds" THEY WRITE

From NORTH to SOUTH from EAST to WEST EVERY BODY IS FLYING OUR

5 FOOT SCALE MODELS ACTUALLY the SIZE **1/3** of REAL PLANES!

$1 EACH

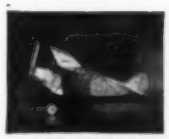
PLUS 38c FOR PACKING, POSTAGE AND INSURANCE

IF EXPRESS COLLECT SEND ONLY $1.00

Amazing is all we can say—but why not? We are receiving thousands of letters from all parts of the country praising our new Giant Models—letters that are delirious with joy speaking of the real flying achievements of these planes that are actually ⅓ the size of real passenger carrying planes. Even we are overwhelmed at the terrific response of the model builders of America—a response which has exceeded our wildest expectations—17,000 of these models have been sold and built (proof of this in our files)—representing 17,000 enthusiastic endorsers of our planes. Doesn't it thrill you? Imagine!—amazing gigantic models—each a strong outdoor flyer!—a $10.00 value for only $1.00. Everything is in the kit INCLUDING ALL LIQUIDS—nothing else to buy! There is no catch! Inspect our kits at any dealer or read for yourself what each kit contains. If you are not convinced that our kits are the biggest values, don't order. If you already realize what bargains our kits are, send your order today and in a few days you will be the owner of a beautiful flying scale model that will make you the envy of your schoolmates and neighborhood.

5 ft. Monocoupe

CONTENTS: Each of these new G.H.Q. Giant 5 ft. Model Planes contains full-size Plans, all ribs, formers and curved parts clearly printed on best grade Balsa. Large bottles Cement and Dope, different colors Japanese Tissue, Special Endurance Rubber, finished Ready-Cut 3" Wheels, Wire, Balsa strips cut to size, Washers, and . . . Movable Controls, shock-proof Landing Gear, Scale Details, Lettering, Numbering and Insignias, Flight Log, etc.



5 FT. STINSON RELIANT

NOTE: We have dealers in almost every city. Visit your dealer first for our kits. If you cannot locate a dealer who can supply you, order direct from us. Send money order, check, stamps, or cash. Send only one dollar if you want express delivery, charges collect.

24 HOUR SERVICE ON ALL ORDERS

5 FT. HEATH PARASOL

"FLY LIKE BIRDS"

Lemont, Illinois, June 28th, 1935.

Dear Sir:

The last time I ordered a kit, I was very much pleased with it. It takes off like a real plane and lands like one. They are the most complete kits I have ever seen. Anybody who buys one of these don't have to think they are buying a cat in the bag, because they fly like birds and you don't hardly need any work to construct them.

Yours truly,

GEORGE ELIASEK,
Lemont, Illinois.

G.H.Q. KITS

FLY BETTER · COST LESS · CONTAIN MORE · ALL HIGH QUALITY · ACCURATE for EXPERTS · EASY for BEGINNERS

"900 FOOT FLIGHT"

Wellsville, Ohio, May 28, 1935.

G. H. Q. Model Airplane Co.,
564 South Boulevard, New York, N. Y.

Dear Sir:—

Enclosed please find a money order for $1.35 for which please send me your 5 ft. Monocoupe. I have built your five foot Stinson Reliant and it turned out all right. I got flights of 900 feet from it. I want to build this monocoupe and see what kind of flights I get from it. Please send the Monocoupe as soon as possible, because I am anxious to get started on it.

Sincerely yours,
ROBERT TRUAX,
R. D. 1, Wellsville, Ohio.

36" FLYING SCALE MODELS 50c

plus 20c packing, postage, insurance

G.H.Q. Scale Models are the best Kits your money can buy for appearance and flights. Buy one today and you'll buy a whole fleet of them. Get acquainted with G.H.Q. Kits and no others will do.

AT YOUR DEALER OR DIRECT

DEALERS—IT'S SURE FIRE!

Read this ad and judge for yourself how G. H. Q. planes are sweeping the country. They're different—there's nothing like them on the market—the biggest values—and do they fly!

17,000 5 FT. KITS ALREADY SOLD!!

Doesn't that show that G. H. Q. model airplanes have taken the public by storm? The whole country's talking about them—the smash hit of 1935!

CASH IN ON G. H. Q. KITS!!!

The days of October 1st to December 31st will be red letter days for every dealer looking for new lines that will bring him increased business and greater profits. Big sales, of course, all year around too! "Cash in" on our national advertising campaign—one of the largest in model airplane history! This means quick sales and repeat orders. We have a complete line of kits from 10c to $1.00. Write for details and discounts today!

G.H.Q. MODEL AIRPLANE CO.,
564 Southern Boulevard, New York, N. Y.

And Don't Forget These Marvelous G. H. Q. Values

24" FLYING SCALE MODELS 25c

plus 10c packing, postage, insurance

Each 24" G.H.Q. Kit is complete in every detail. A liberal quantity of everything. 18 models to select from at 25c each.

Puss Moth
Polish Fighter
Army Falcon
Sopwith Camel
Fokker D-7
SE5
Aeromarine
Army Hawk
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Fairchild "22"
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Douglas Mailplane
Stinson "R"
Curtiss JN4
Bellanca

24" CURTISS ROBIN, 25c

Buy these kits at your dealer—order by coupon or letter

G.H.Q. MODEL AIRPLANE CO., 564 SO. BLVD., NEW YORK, N.Y.

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- ☐ Sikorsky S-41
- ☐ Douglas Airliner
- ☐ Dewoitine D-33
- ☐ U.S. Army Martin Bomber
- ☐ Monocoupe 145-D

24" FLYING KITS

- ☐ Curtiss JN4
- ☐ Bellanca
- ☐ Nieuport
- ☐ Douglas Mailplane
- ☐ Stinson "R"
- ☐ Puss Moth
- ☐ Fokker D-7
- ☐ Fokker D-8
- ☐ Polish Fighter
- ☐ Monocoupe
- ☐ Falcon
- ☐ Aeromarine
- ☐ S. E. 5
- ☐ Sopwith Camel
- ☐ Aeronca
- ☐ Fairchild
- ☐ Army Hawk
- ☐ Curtiss Robin

36" FLYING KITS

- ☐ Douglas Y-10
- ☐ Curtiss A8 Attack
- ☐ Northrop Gamma "Skychief"

5 FT. FLYING KITS

- ☐ Monocoupe
- ☐ Stinson Reliant
- ☐ Heath Parasol

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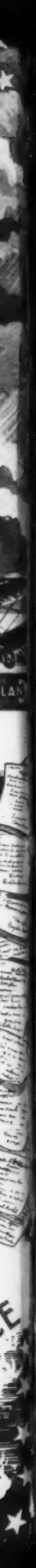
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